

# Service Manual

## Color Television

**CHASSIS : SC-150**

**Model : DSC-3220E/3220L**



**DAEWOO ELECTRONICS Corp.**

*<http://svc.dwe.co.kr>*

DEC . 2002

**DAEWOO**

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## 1- Main Features

### 1-1 Specifications

|                            |   |
|----------------------------|---|
| <b>TV standard</b>         | PAL - SECAM B/G D/K, PAL I/I, SECAM L/L'  |
| <b>Sound system</b>        | NICAM B/G, I, D/K, L,<br>FM 2Carrier B/G, D/K   |
| <b>Power consumption</b>   | 32" 16:9 Real Flat : 110W approx.   |
| <b>Sound Output Power</b>  | 7W x2 (at 1KHz, 60% mod, 10% THD)   |
| <b>Speaker</b>             | 10W(Normal) 8 ohm X 2   |
| <b>Teletext system</b>     | 10 pages memory FASTEXT (FLOF or TOP)   |
| <b>Aerial input</b>        | 75 ohm unbalanced   |
| <b>Channel coverage</b>    | Off-air channels, S-cable channels and hyperband  |
| <b>Tuning system</b>       | frequency synthesiser tuning system   |
| <b>Visual screen</b>       | 32" : 76Cm  |
| <b>Channel indication</b>  | On Screen Display   |
| <b>program Selection</b>   | 100 programmes  |
| <b>Aux. terminal</b>       | EURO-SCART 1 : Audio / Video In and Out, R/G/B In, Slow and Fast switching.<br>EURO-SCART 2 : Audio / Video In and Out, SVHS In.<br>Monitor Out<br>AV3 : Audio-Video Jack on right side of cabinet.<br>Headphone jack (3.5 mm) on right side of cabinet<br>SVHS3 : Jack on right side of cabinet - sound input common with AV3. |
| <b>Remote Control Unit</b> | R-46G22   |

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### Specification matrix

| Chassis Name  | SC-150   |   |
|---|--|---|
| Model Name  | DSC-3220E  | DSC-3220L                                   |
| VCT Version   | 3834   |   |
| Software Version  | A  |   |
| Remote Control  | R46G22   |   |
| PCB Serial Number   | 4859812224(MAIN)/ 4959812324(Union)  |   |
| Tube  | 16:9 Real Flat   |   |
| SVHS 3  | ✓  |   |
| "Picture Improvements,<br>Comb Filter, Horizontal Scaler" | ✓  |   |
| Teletext Split Screen                                     | ✓  |   |
| Formats Available in Video Mode                           | Auto / 4:3 / 14:9 / Zoom 14:9 / Zoom<br>16:9 / Full Screen   |   |
| AV2 Monitor Output  | ✓  |   |
| MSP Version   | 3410G  | 3411G                                       |
| Sound Dffects   | Off / Spatial  | Off / Spatial / Panorama /<br>Dolby Virtual |
| Graphic Equalizer   | ✓  |   |
| AV3 Audio Input   | Dedicated  |   |
| Teletext Page Memory                                      | 10 Page  |   |
| Top Teletext  | Available : Selectable in factory /<br>Service mode by option bits   |   |
| Flof Teletext   | Available : Selectable in factory /<br>Service mode by option bits   |   |
| Text Character Support                                    | "Pan-European Latin, Cyrillic, Greek"  |   |
| OSD Languages   | "English, French, German, Italian, Spanish,Dutch, Danish,<br>Finnish, Norwegian, Swedish, Greek,Polish, Czech, Slovakian,<br>Romanian, Russian, Bulgarian, Hungarian |   |
| Tuner Options   | "Philips, Alps,Partsnic"   |   |

21 Pin EURO-SCART 1 :

| Pin | Signal Description | Matching value  |
|-----|--------------------|---|
| 1   | Audio Output Right | 0.5 Vrms, Impedance < k $\Omega$ , ( RF 54% Mod )                                     |
| 2   | Audio Input Right  | 0.5 Vrms, Impedance > 10 k $\Omega$   |
| 3   | Audio Output Left  | 0.5 Vrms, Impedance < k $\Omega$ , ( RF 54% Mod )                                     |
| 4   | Audio Earth        |   |
| 5   | Blue Earth         |   |
| 6   | Audio Input Left   | 0.5 Vrms, Impedance > 10 k $\Omega$   |
| 7   | Blue Input         | 0.7 Vpp $\pm$ 0.1V, Impedance 75 $\Omega$   |
| 8   | Slow Switching     | TV : 0 to 2V, AV 16/9 : 4.5 to 7V, AV 4/3 : 9.5 to 12V ,<br>Impedance > 10 k $\Omega$ |
| 9   | Green Earth        |   |
| 10  | N.C.               |   |
| 11  | Green Input        | 0.7 Vpp $\pm$ 0.1V, Impedance 75 $\Omega$   |
| 12  | N.C.               |   |
| 13  | Red Earth          |   |
| 14  | Blanking Earth     |   |
| 15  | Red Input          | 0.7 Vpp $\pm$ 0.1V, Impedance 75 $\Omega$   |
| 16  | Fast Switching     | 0 to 0.4V : Logic "0", 1 to 3V : Logic "1", Impedance 75 $\Omega$                     |
| 17  | Video Out Earth    |   |
| 18  | Video In Earth     |   |
| 19  | Video Output       | 1 Vpp $\pm$ 3dB, Impedance 75 $\Omega$  |
| 20  | Video Input        | 1 Vpp $\pm$ 3dB, Impedance 75 $\Omega$  |
| 21  | Common Earth       |   |

21 Pin EURO-SCART 2 :

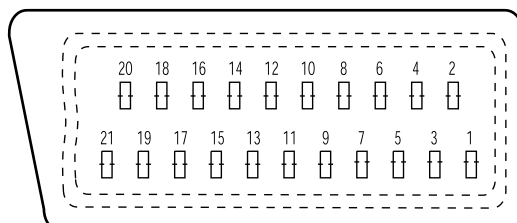
| Pin | Signal Description | Matching value  |
|-----|--------------------|---|
| 1   | Audio Output Right | 0.5 Vrms, Impedance < 1 k $\Omega$ , ( RF 54% Mod ) - Not available for cp885 |
| 2   | Audio Input Right  | 0.5 Vrms, Impedance > 10 k $\Omega$   |
| 3   | Audio Output Left  | 0.5 Vrms, Impedance < 1 k $\Omega$ , ( RF 54% Mod ) - Not available for cp885 |
| 4   | Audio Earth        |   |
| 5   | Earth              |   |
| 6   | Audio Input Left   | 0.5 Vrms, Impedance > 10 k $\Omega$   |
| 7   | N.C.               |   |
| 8   | Slow Switching     | TV: 0 to 2V, AV 16:9: 4.5V to 7V, AV 4:3: 9.5 to 12V                          |
| 9   | N.C.               |   |
| 10  | N.C.               |   |
| 11  | N.C.               |   |
| 12  | N.C.               |   |
| 13  | Earth              |   |
| 14  | Earth              |   |
| 15  | Chroma Input       | $\pm$ 3dB for a luminance signal of 1 Vpp                                     |
| 16  | N.C.               |   |
| 17  | Earth              |   |
| 18  | Video In Earth     |   |

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|    |                    |  |
|----|--------------------|--|
| 19 | Video Output       | 1 Vpp± 3dB, Impedance 75Ω ( Monitor output ) - Not available for cp885 |
| 20 | Video Input, Y In. | 1 Vpp± 3dB, Impedance 75Ω  |
| 21 | Common Earth       |  |





1-2 Channel table

**FREQUENCY TABLE**

| <b>CH</b> | <b>EUROPE CCIR</b> | <b>FRANCE</b> | <b>GB(IRELAND)</b> | <b>EAST OIRT</b> |
|-----------|--------------------|---------------|--------------------|------------------|
| C01       | 46.25              | -             | 47.75              | 49.75            |
| C02       | 48.25              | 55.75 (L)     | 53.75              | 59.25            |
| C03       | 55.25              | 60.5 (L)      | 61.75              | 77.25            |
| C04       | 62.25              | 63.75 (L)     | 175.25             | 85.25            |
| C05       | 175.25             | 176.00        | 183.25             | 93.25            |
| C06       | 182.25             | 184.00        | 191.25             | 175.25           |
| C07       | 189.25             | 192.00        | 199.25             | 183.25           |
| C08       | 196.25             | 200.00        | 207.25             | 191.25           |
| C09       | 203.25             | 208.00        | 215.25             | 199.25           |
| C10       | 210.25             | 216.00        | 223.25             | 207.25           |
| C11       | 217.25             | 189.25 (LUX)  | 231.25             | 215.25           |
| C12       | 224.25             | 69.25 (L)     | 239.25             | 223.25           |
| C13       | 53.75              | 76.25 (L)     | 247.25             | -                |
| C14       | -                  | 83.25 (L)     | 49.75              | -                |
| C15       | 82.25              | 90.25         | 57.75              | -                |
| C16       | -                  | 97.25         | 65.75              | -                |
| C17       | 183.75             | -             | 77.75              | -                |
| C18       | 192.25             | -             | 85.75              | -                |
| C19       | 201.25             | -             | -                  | -                |
| C20       | -                  | -             | -                  | -                |
| C21       | 471.25             | 471.25        | 471.25             | 471.25           |
| C22       | 479.25             | 479.25        | 479.25             | 479.25           |
| C23       | 487.25             | 487.25        | 487.25             | 487.25           |
| C24       | 495.25             | 495.25        | 495.25             | 495.25           |
| C25       | 503.25             | 503.25        | 503.25             | 503.25           |
| C26       | 511.25             | 511.25        | 511.25             | 511.25           |
| C27       | 519.25             | 519.25        | 519.25             | 519.25           |
| C28       | 527.25             | 527.25        | 527.25             | 527.25           |
| C29       | 535.25             | 535.25        | 535.25             | 535.25           |
| C30       | 543.25             | 543.25        | 543.25             | 543.25           |
| C31       | 551.25             | 551.25        | 551.25             | 551.25           |
| C32       | 559.25             | 559.25        | 559.25             | 559.25           |
| C33       | 567.25             | 567.25        | 567.25             | 567.25           |
| C34       | 575.25             | 575.25        | 575.25             | 575.25           |
| C35       | 583.25             | 583.25        | 583.25             | 583.25           |
| C36       | 591.25             | 591.25        | 591.25             | 591.25           |
| C37       | 599.25             | 599.25        | 599.25             | 599.25           |
| C38       | 607.25             | 607.25        | 607.25             | 607.25           |
| C39       | 615.25             | 615.25        | 615.25             | 615.25           |
| C40       | 623.25             | 623.25        | 623.25             | 623.25           |
| C41       | 631.25             | 631.25        | 631.25             | 631.25           |

| <b>CH</b> | <b>EUROPE CCIR</b> | <b>FRANCE</b> | <b>GB(IRELAND)</b> | <b>EAST OIRT</b> |
|-----------|--------------------|---------------|--------------------|------------------|
| C42       | 639.25             | 639.25        | 639.25             | 639.25           |
| C43       | 647.25             | 647.25        | 647.25             | 647.25           |
| C44       | 655.25             | 655.25        | 655.25             | 655.25           |
| C45       | 663.25             | 663.25        | 663.25             | 663.25           |
| C46       | 671.25             | 671.25        | 671.25             | 671.25           |
| C47       | 679.25             | 679.25        | 679.25             | 679.25           |
| C48       | 687.25             | 687.25        | 687.25             | 687.25           |
| C49       | 695.25             | 695.25        | 695.25             | 695.25           |
| C50       | 703.25             | 703.25        | 703.25             | 703.25           |
| C51       | 711.25             | 711.25        | 711.25             | 711.25           |
| C52       | 719.25             | 719.25        | 719.25             | 719.25           |
| C53       | 727.25             | 727.25        | 727.25             | 727.25           |
| C54       | 735.25             | 735.25        | 735.25             | 735.25           |
| C55       | 743.25             | 743.25        | 743.25             | 743.25           |
| C56       | 751.25             | 751.25        | 751.25             | 751.25           |
| C57       | 759.25             | 759.25        | 759.25             | 759.25           |
| C58       | 767.25             | 767.25        | 767.25             | 767.25           |
| C59       | 775.25             | 775.25        | 775.25             | 775.25           |
| C60       | 783.25             | 783.25        | 783.25             | 783.25           |
| C61       | 791.25             | 791.25        | 791.25             | 791.25           |
| C62       | 799.25             | 799.25        | 799.25             | 799.25           |
| C63       | 807.25             | 807.25        | 807.25             | 807.25           |
| C64       | 815.25             | 815.25        | 815.25             | 815.25           |
| C65       | 823.25             | 823.25        | 823.25             | 823.25           |
| C66       | 831.25             | 831.25        | 831.25             | 831.25           |
| C67       | 839.25             | 839.25        | 839.25             | 839.25           |
| C68       | 847.25             | 847.25        | 847.25             | 847.25           |
| C69       | 855.25             | 855.25        | 855.25             | 855.25           |
| C70       | 863.25             | 863.25        | 863.25             | 863.25           |
| C71       | 69.25              | -             | -                  | -                |
| C72       | 76.25              | -             | -                  | -                |
| C73       | 83.25              | -             | -                  | -                |
| C74       | 90.25              | -             | -                  | -                |
| C75       | 97.25              | -             | -                  | -                |
| C76       | 59.25              | -             | -                  | -                |
| C77       | 93.25              | -             | -                  | -                |
| S01       | 105.25             | 104.75        | 103.25             | 105.25           |
| S02       | 112.25             | 116.75        | 111.25             | 112.25           |
| S03       | 119.25             | 128.75        | 119.25             | 119.25           |
| S04       | 126.25             | 140.75        | 127.25             | 126.25           |
| S05       | 133.25             | 152.75        | 135.25             | 133.25           |
| S06       | 140.25             | 164.75        | 143.25             | 140.25           |
| S07       | 147.25             | 176.75        | 151.25             | 147.25           |
| S08       | 154.25             | 188.75        | 159.25             | 154.25           |
| S09       | 161.25             | 200.75        | 167.25             | 161.25           |

| <b>CH</b>  | <b>EUROPE CCIR</b> | <b>FRANCE</b> | <b>GB(IRELAND)</b> | <b>EAST OIRT</b> |
|------------|--------------------|---------------|--------------------|------------------|
| <b>S10</b> | 168.25             | 212.75        | -                  | 168.25           |
| <b>S11</b> | 231.25             | 224.75        | -                  | 231.25           |
| <b>S12</b> | 238.25             | 236.75        | -                  | 238.25           |
| <b>S13</b> | 245.25             | 248.75        | 255.25             | 245.25           |
| <b>S14</b> | 252.25             | 260.75        | 263.25             | 252.25           |
| <b>S15</b> | 259.25             | 272.75        | 271.25             | 259.25           |
| <b>S16</b> | 266.25             | 284.75        | 279.25             | 266.25           |
| <b>S17</b> | 273.25             | 296.75        | 287.25             | 273.25           |
| <b>S18</b> | 280.25             | 136.00        | 295.25             | 280.25           |
| <b>S19</b> | 287.25             | 160.00        | 303.25             | 287.25           |
| <b>S20</b> | 294.25             | -             | -                  | 294.25           |
| <b>S21</b> | 303.25             | 303.25        | -                  | 303.25           |
| <b>S22</b> | 311.25             | 311.25        | 311.25             | 311.25           |
| <b>S23</b> | 319.25             | 319.25        | 319.25             | 319.25           |
| <b>S24</b> | 327.25             | 327.25        | 327.25             | 327.25           |
| <b>S25</b> | 335.25             | 335.25        | 335.25             | 335.25           |
| <b>S26</b> | 343.25             | 343.25        | 343.25             | 343.25           |
| <b>S27</b> | 351.25             | 351.25        | 351.25             | 351.25           |
| <b>S28</b> | 359.25             | 359.25        | 359.25             | 359.25           |
| <b>S29</b> | 367.25             | 367.25        | 367.25             | 367.25           |
| <b>S30</b> | 375.25             | 375.25        | 375.25             | 375.25           |
| <b>S31</b> | 383.25             | 383.25        | 383.25             | 383.25           |
| <b>S32</b> | 391.25             | 391.25        | 391.25             | 391.25           |
| <b>S33</b> | 399.25             | 399.25        | 399.25             | 399.25           |
| <b>S34</b> | 407.25             | 407.25        | 407.25             | 407.25           |
| <b>S35</b> | 415.25             | 415.25        | 415.25             | 415.25           |
| <b>S36</b> | 423.25             | 423.25        | 423.25             | 423.25           |
| <b>S37</b> | 431.25             | 431.25        | 431.25             | 431.25           |
| <b>S38</b> | 439.25             | 439.25        | 439.25             | 439.25           |
| <b>S39</b> | 447.25             | 447.25        | 447.25             | 447.25           |
| <b>S40</b> | 455.25             | 455.25        | 455.25             | 455.25           |
| <b>S41</b> | 463.25             | 463.25        | 463.25             | 463.25           |

1-3 ATSS sorting method

The TV set sweeps all the TV bands from beginning of VHF to end of UHF. The TV controlling software for each program checks if a VPS CNI code is transmitted ( this system exists for German, Swiss and Austrian transmissions). If no VPS CNI code is found then the system check if a CNI code is transmitted as part of the teletext transmission ( Packet 8/30 format 1 ). If such a code ( VPS or teletext ) is found and if this code is in the ATSS list, the program is automatically named.

If the transmission does not have VPS CNI, and no teletext service is available, then there is no possibility of the program being automatically named.

The programs found are then sorted in 4 groups :

**Group I** : It contains all the pro grams from the selected country and named by the TV controlling software. Within this group the sorting order is fixed by the ATSS list.

**Group II** : It contains all the pro grams with a strong signal strength which are not listed in group I.

**Group III** : It contains all the pro grams with a weak signal strength which are not listed in group I.

**Group IV** : If two or more programs with the same code are found, only the strongest ( or if they have the same level the one with the lowest frequency) is listed in group I, II or III. The others are listed in group IV.

| Program number | Group     | Skip |
|----------------|-----------|------|
| 1              | Group I   |      |
| 2              |           |      |
| ...            |           |      |
| n              |           |      |
| n+1            | Group II  |      |
| ...            |           |      |
| m              |           |      |
| m+1            |           |      |
| ...            | Group III |      |
| p              |           |      |
| p+1            |           |      |
| ...            | Group IV  | ✓    |
| q              |           |      |
| q+1            |           |      |
| ...            | not used  | ✓    |
| 99             |           |      |
| 0              |           |      |

| Program number | Group     | Skip |
|----------------|-----------|------|
| 1              | Group II  |      |
| ...            |           |      |
| m              |           |      |
| m+1            | Group III |      |
| ...            |           |      |
| p              |           |      |
| p+1            | Group IV  | ✓    |
| ...            |           |      |
| q              |           |      |
| q+1            | not used  | ✓    |
| ...            |           |      |
| 99             |           |      |
| 0              |           |      |

Special case : **Country selection = Others**

Special case : **France**

Note : If two programs with the same name but a different code are found these two programs are listed in group I, II or III ( e.g. Regional program SW3 in Germany ).

The sorting order within group II, III, and IV is based on the channel frequency. The Program with the lowest frequency is allocated the first rank in its group, and so forth until the last program of the group which has the highest frequency.

**Special case : France**

If France is selected, the TV controlling software first sweeps all TV bands with France system selected (positive video modulation) and the a second time with Europe system selected (negative video modulation).

**Special case : Switzerland**

If Switzerland is selected the TV controlling software first sweeps all TV bands with Europe system selected (negative video modulation) and then a second time with France system selected (positive video modulation).

**Special case : GB**

Note for satellite receiver users : Before starting ATSS turn On your satellite receiver and tune "SKY NEWS".  
If GB is selected the TV controlling software seeks for programs only in UHF (C21 to C70).

The sorting order is :

- 1 - BBC1
- 2 - BBC2
- 3 - ITV
- 4 - CH4
- 5 - CH5
- 6 - NEWS

If two or more "identical" programs (same name but different code e.g. BBC1 and BBC1 Scotland) are found the following programs in the list will be shifted up. (1 - BBC1, 2 - BBC1, 3 - BBC2, 4 -ITV, 5 - CH4, 6 - CH5, 7 - NEWS, ..)

If one of the program above is not found, the associated program number remains empty (freq.=467.25 Mhz - Skip selected - no name - system=GB).

example A : 1 - BBC1, 2 - BBC2, 3 - ITV , 4 - ----, 5 - CH5, 6 - NEWS , ...

example B (if 2 BBC1 found) : 1 - BBC1, 2 - BBC1, 3 - BBC2, 4 - IT V, 5 - ----, 6 - CH5, 7 -NEWS, ...

### **2 - Safety instruction**

**WARNING:** Only competent service personnel may carry out work involving the testing or repair of this equipment.

#### **X-RAY RADIATION PRECAUTION**

1. Excessive high voltage can produce potentially hazardous X-RAY RADIATION. To avoid such hazards, the high voltage must not exceed the specified limit. The nominal value of the high voltage of this receiver is 26 KV (25" - 28") at max beam current. The high voltage must not, under any circumstances, exceed 29.5 KV (25") or 30 KV (28"). Each time a receiver requires servicing, the high voltage should be checked. It is important to use an accurate and reliable high voltage meter.
2. The only source of X-RAY Radiation in this TV receiver is the picture tube. For continued X-RAY RADIATION protection, the replacement tube must be exactly the same type tube as specified in the parts list.

#### **SAFETY PRECAUTION**

1. Potentials of high voltage are present when this receiver is operating. Operation of the receiver outside the cabinet or with the back board removed involves a shock hazard from the receiver.
  - 1) Servicing should not be attempted by anyone who is not thoroughly familiar with the precautions necessary when working on high voltage equipment.
  - 2) Discharge the high potential of the picture tube before handling the tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled.
2. If any Fuse in this TV receiver is blown, replace it with the FUSE specified in the Replacement Parts List.
3. When replacing a high wattage resistor ( metal oxide film resistor) in the circuit board, keep the resistor 10 mm away from circuit board.
4. Keep wires away from high voltage or high temperature components.
5. This receiver must operate under AC 230 volts, 50 Hz. NEVER connect to DC supply or any other power or frequency.

#### **PRODUCT SAFETY NOTICE**

Many electrical and mechanical parts in this equipment have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-RAY RADIATION protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual and its supplements, electrical components having such features are identified by designated symbol on the parts list. Before replacing any of these components, read the parts list in this manual carefully. The use of substitutes replacement parts which do not have the same safety characteristics as specified in the parts list may create X-RAY Radiation.

### 3 - Alignment instructions

3-1 Microcontroller configuration : Service mode

To switch the TV set into service mode please see instruction below.

- 1 - Select pr. number 91
- 2 - Adjust sharpness to minimum and exit all menu.
- 3 - Quickly press the key sequence : **RED - GREEN - menu**

To software version is displayed beside the word Service, e.g. “ SERVICE V2.00A”.

To exit SERVICE menu press **menu** key or **Std By** key.

3-2 Service mode navigation

Pr Up / Down remote keys : cycle through the service items available.

Vol- / + remote keys : Decrement / Increment the values within range.

0~7 digit keys : Toggle bits 0~7 in option byte

| Order | Item      | Default settingh for SC-150 |
|-------|-----------|-----------------------------|
| 1     | PARABOLA  | +124                        |
| 2     | HOR WIDTH | -1350                       |
| 3     | CORNER    | -97                         |
| 4     | HOR.PARAL | -1                          |
| 5     | V.LINEAR  | 0                           |
| 6     | EW TRAPEZ | -30                         |
| 7     | S CORRECT | -21                         |
| 8     | H BOW     | +100                        |
| 9     | VERT SIZE | +157                        |
| 10    | VERT CENT | +3889                       |
| 11    | RED GAIN  | +97                         |
| 12    | GRN GAIN  | +87                         |
| 13    | BLUE GAIN | +95                         |
| 14    | RED BIAS  | +128                        |
| 15    | GRN BIAS  | +128                        |
| 16    | HOR CEN   | 92                          |
| 17    | AGC LEVEL | -                           |
| 18    | G2-SCREEN | -                           |
| 19    | AFT       | -                           |
| 20    | OPTION1   | -                           |
| 21    | OPTION2   | -                           |
| 22    | MAXV OL   | Not used                    |

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### 3-3 Microcontroller configuration : Option bits

These option bits are available from Service mode. First find the OPTION control, and then use keys 0...7 on the remote keypad to control bits 0 to 7 respectively. The table below shows the options available ;

| OPTION 1 |              |                   |           |                             |    |               |  |    |
|----------|--------------|-------------------|-----------|-----------------------------|----|---------------|--|----|
|          | B7           | B6                | B5        | B4                          | B3 | B2            | B1   | B0 |
| 1        | TOP text off | FASTEXT FLOF off  | TUBE 4:3  | AUTO 4:3 switch to PANORAMA | X  | SVHS3 disable | Tuner options<br>00=Philips<br>01=ALPS<br>10=Philips (AGC intern)<br>11=DAEWOO |    |
| 0        | TOP text on  | FASTEXT (FLOF) on | TUBE 16:9 | AUTO 4:3 switch to 4:3      |    | SVHS3 enable  |  |    |

| OPTION 2 |    |    |    |                  |                              |  |    |    |
|----------|----|----|----|------------------|------------------------------|--|----|----|
|          | B7 | B6 | B5 | B4               | B3                           | B2   | B1 | B0 |
| 1        | Y  | Y  | Y  | PICTURE TILT on  | Normal I brightness          | See table below.<br>OPTION 2 bits B2 B1 B0 |    |    |
| 0        |    |    |    | PICTURE TILT off | Normal I brightness +5 steps |  |    |    |

Set all the unused bits, marked 'X', to be 0 for future compatibility.

### 3-4 TV set Alignment

#### 3-4-1- Local oscillator alignment

Tune a colour bar pattern. The Frequency of the signal carrier must be accurate (Max +/- 10kHz deviation from the nominal channel frequency).

Find "AFT" item in service mode.

Adjust the coil L150 to bring the cursor to central position : 32.

#### 3-4-2- G2 alignment

- Tune a colour bar pattern.

- Find the "G2 - SCREEN" item in service mode.

- Adjust screen volume (on FBT) to bring the cursor to central position : 32.

#### 3-4-3- White balance

- Select a dark picture and adjust RED BIAS and GRN BIAS to the desired colour temperature.

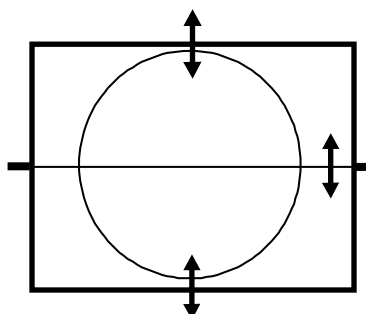
- Select a bright picture and adjust REC, GRN and BLUE GAIN to the desired colour temperature.

#### 3-4-4- Focus

Adjust the Focus volume (on FBT) to have the best resolution on screen.

#### 3-4-5- Vertical geometry

Adjust V.LINEAR (linearity), S CORRECT (S. Corrention), VERT SIZE (Vertical amplitude), VERT CENT (vertical centing) to compensate for vertical distortion.



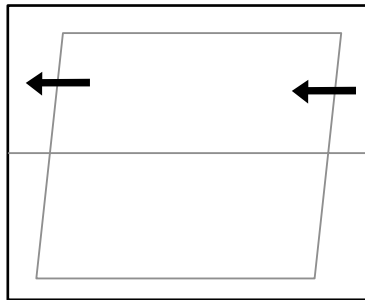


3-4-6- Horizontal picture centring

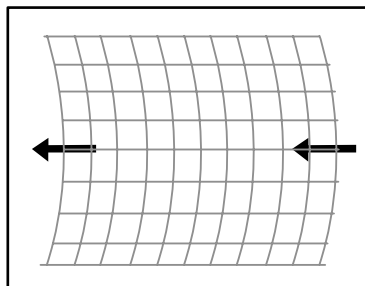
Adjust HOR CEN(Horizontal center) to have the picture in the center of the screen.

3-4-7- Eau/West comection

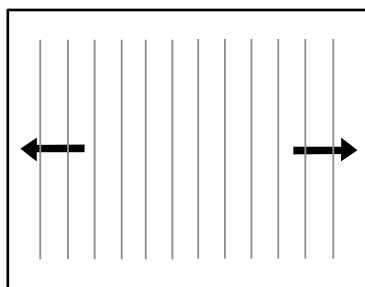
Adjust the PARABOLA, HOR WIDTH, CORNER, HOR PARAL, EW TRAPEZ, H BOW, to compensate for geometrical distorrin,



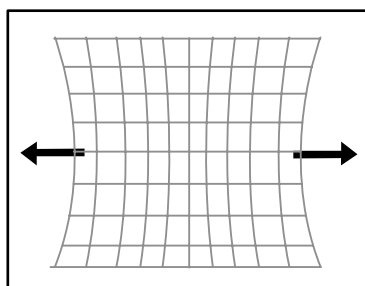
HOR PARAL



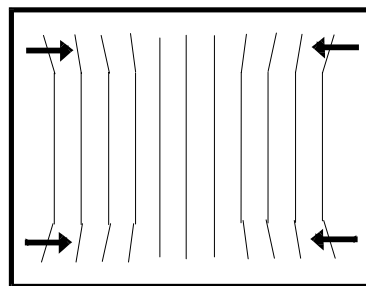
H BOW



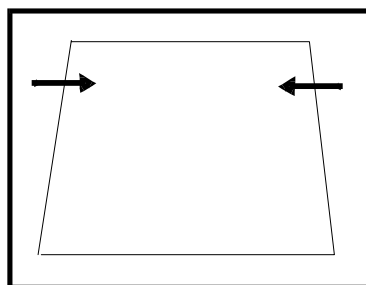
HOR WIDTH For HOR WIDTH, adjust for 91% overscan.



PARAROLA



**CORNER**



**EW TRAPEZ**

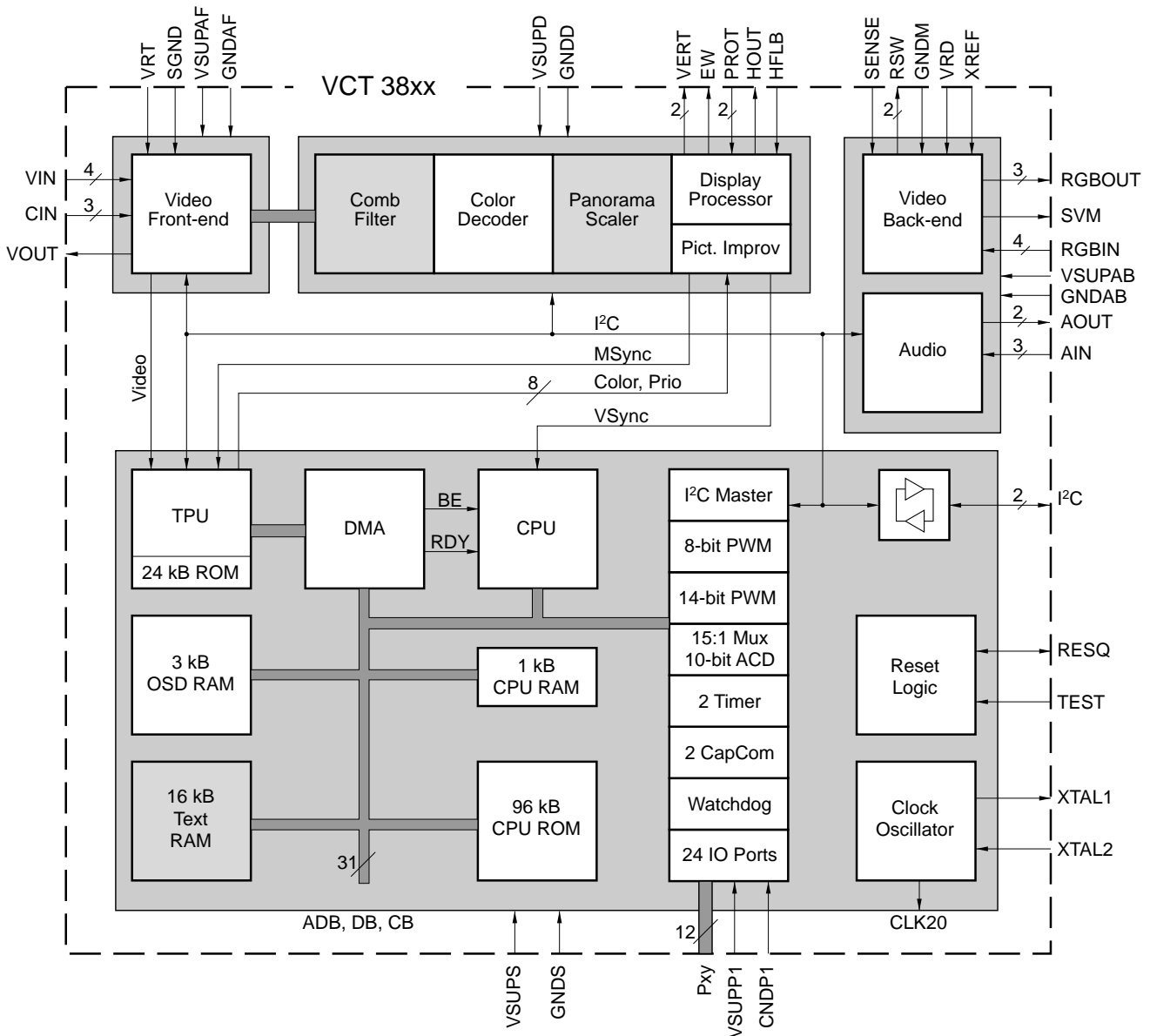
3-4-8- AGC

- Adjust the antenna signal level at  $70 \text{ dB}\mu\text{V}\pm 2$
- Tune a colour bar pattern.
- Find the "AGC" item in service mode.
- Adjust AGC volume ( RB10 ) to bring the cursor to central position : 32.

4 - IC description

4-1 VCT383XA TV signal processor - Teletext decoder with embedded 8 bit  $\mu$ - Controller.

4-1-1- Block diagram of the VCT



4-1-2- TV-signal Processor

- Four composite video inputs, two S-VHS inputs
- Analogue YC r C b input
- Composite video monitor
- Multistandard colour decoder ( 1 crystal )
- Multistandard sync decoder
- Black-line detector
- Adaptive 2H comb filter Y/C separator

- Horizontal scaling ( 0.25 to 4 )
- Panoramavision
- Black-level expander
- Dynamic peaking
- Soft limiter (gamma corection)
- Colour transient improvement
- Programmable RGB matrix
- Analogue RGB/Fastblank input
- Half-contrast switch
- Picture frame generator
- Scan velocity modulation output
- High-performance H/V deflection
- Angle and bow correction
- Separate ADC for tube measurements
- EHT compensation

### 4-1-3- $\mu$ -Controller

- 8-bit, 10-Mhz CPU (65C02)
- 96 kB program ROM on chip
- 1 kB program RAM on chip
- memory banking
- 16-input, 16-level interrupt controller
- patch module for 10 ROM locations
- two 16-bit reloadable timers
- capture compare module
- watchdog timer
- 14-bit PWM for voltage synthesis
- Four 8-bit PWMs
- 10-bit ADC with 15:1 input MUX
- I2C bus master interface
- 24 programmable I/O ports
- 80C51  $\mu$ -controller core standard instruction set and timing
- 1  $\mu$  s machine cycle
- 32-128Kx8-bit late programmed ROM
- 3-12Kx8-bit Auxiliary RAM (shared with Display and Acquisition)
- Interrupt controller for individual enable/disable with two level priority
- Two 16-bit Timer/Counter registers
- WatchDog timer
- Auxiliary RAM page pointer
- 16-bit Data pointer
- IDLE and Power Down (PD) mode
- 14 bits PWM for Voltage Synthesis Tuning
- 8-bit A/D converter
- 4 pins which can be programmed as general I/O pin, ADC input or PWM (6-bit) output

### 4-1-4- Teletext Features

- Four programmable video inputs
- Adaptive data slicer
- Signal quality detection
- WST, PDC, VPS, and WSS acquisition

High-level command language  
FLOF (Fasttext), and TOP support  
10 pages memory on chip (10kB)

#### 4-1-5- Display OSD Features

3kB OSD RAM on chip  
WST level 1.5 compliant  
WST level 2 parallel attributes  
32 foreground/background colours  
programmable colour look-up table  
1024 mask programmable characters  
17 national languages  
(Latin, Cyrillic and Greek character sets)  
Character matrix 10x10  
4-color mode for user font

#### 4-1-6- Audio Features

Three mono inputs  
Two mono outputs  
Programmable channel select  
Volume control for one mono channel

#### 4-1-7- General Features

Submicron CMOS technology  
Low-power standby mode  
Single 20.25 MHz crystal  
64-pin PSDIP package

#### 4-1-8- Data Capture

The Video Front End section takes in the analogue Composite Video and Blanking Signal (CVBS), and from this extracts the required data, which is then decoded and stored in memory.

The extraction of the data is performed in the digital domain. The first stage is to select and convert the analogue CVBS signal into a digital form. This is done using 8 bit ADC sampling at 20.25 Mhz.

The digital data services transmitted in the VBI are selected and acquired separately from the video part. This is done by the use of an adaptive data slicer. The following data types can be extracted : 625 line World System Teletext (WST), VPS, WSS. The data is acquired and decoded by the teletext decoder (TPU), then stored in an SRAM Interface.

#### 4-1-9- Data Capture Features

Video Signal Quality detector  
Data Capture for 625 line WST  
Data Capture for VPS data (PDC system A)  
Data Capture for Wide Screen Signalling (WSS) bit decoding  
Real-time capture and decoding for WST Teletext in Hardware, to enable optimised microprocessor throughput  
10 page memory stored On-Chip

## Service manual SC-150

- Inventory of transmitted Teletext pages stored in the Page Table
- Signal quality detector for WST data
- Comprehensive Teletext language coverage
- Full Field Vertical Blanking Interval (VBI) data capture of WST data

### 4-1-10- TV processor version and $\mu$ Controller capacity

| IC version              | VCT 3832A | VCT 3834A |
|-------------------------|-----------|-----------|
| 8 bit $\mu$ -controller | ✓         | ✓         |
| ROM size                | 96k       | 96k       |
| RAM size                | 1k        | 1k        |
| PAL decoder             | ✓         | ✓         |
| SECAM decoder           | ✓         | ✓         |
| NTSC decoder            | ✓         | ✓         |
| Picture improvement     | ✓         | ✓         |
| Teletext page memory    | 10 pages  | 10 pages  |
| Adaptive Comb filter    | X         | ✓         |
| Panorama Scaler         |           | ✓         |

### 4-1-11- IC marking and version

| Chassis | IC marking | OSD languages   | ATSS countries  | Text                                 |
|---------|------------|---|---|--------------------------------------|
| SC-150  | VCT3834A   | English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian, Swedish, Greek, Polish, Hungarian, Czech, Slovakian, Romanian, Russian, Bulgarian | GB, France, Germany, Italy, Belgium, Spain, Austria, Poland, Switzerland, Denmark, Finland, Netherlands, Norway, Sweden, Ireland, Hungary, Czech Republic, Others | Pan-European Latin. Cyrillic, Greek. |

### 4-1-12- Pinning

| PSDIP 64-pin | Pin Name  | Type   | Short Description  |
|--------------|-----------|--------|--|
| 1            | Power     | OUT    | High = SMPS ON, Low = SMPS in stand by mode.                         |
| 2            | AGC       | IN     | For service only, tuner AGC, TOP alignment.                          |
| 3            | VSUPP1    | SUPPLY | Supply Voltage, Port ( pin 1, 2, 5, 6, 7, 8, 9, 10, 61, 62, 63, 64). |
| 4            | GNDP1     | SUPPLY | Ground, Port.  |
| 5            | MOD_SW    | OUT    | High = Negative modulation, Low = Positive modulation (L/L').        |
| 6            | SECAML/L' | OUT    | High = L; Low = L.   |
| 7            | AFC       | IN     |  |
| 8            | IR        | IN     |  |
| 9            | SC1.SW    | IN     |  |
| 10           | SC2.SW    | IN     |  |
| 11           | VOUT      | OUT    | Analog Video Output  |
| 12           | VRT       | IN     | Reference Voltage Top, Video ADC                                     |
| 13           | SGND      | IN     | Signal Ground for Analog Input                                       |

| PSDIP<br>64-pin | Pin Name    | Type   | Short Description  |
|-----------------|-------------|--------|--|
| 14              | GNDAF       | SUPPLY | Ground, Analog Front-end                                       |
| 15              | VSUPAF      | SUPPLY | Supply Voltage, Analog Front-end                               |
| 16              | CBIN        | IN     | Analog Component Cb Input                                      |
| 17              | CIN1        | IN     | Analog Chroma 1 Input  |
| 18              | CIN2/CRIN   | IN     | Analog Chroma 2 Input / Analog Component Cr Input              |
| 19              | VIN1        | IN     | Analog Video 1 Input   |
| 20              | VIN2        | IN     | Analog Video 2 Input   |
| 21              | VIN3        | IN     | Analog Video 3 Input   |
| 22              | VIN4        | IN     | Analog Video 4 Input   |
| 23              | TEST        | IN     | Test Pin, Reserved For Test                                    |
| 24              | HOUT        | OUT    | Horizontal Drive Output  |
| 25              | VSUPD       | SUPPLY | Supply Voltage, Digital Circuitry                              |
| 26              | GNDD        | SUPPLY | Ground, Digital Circuitry                                      |
| 27              | FBLIN       | IN     | Fast Blank Input   |
| 28              | RIN         | IN     | Analog Red Input   |
| 29              | GIN         | IN     | Analog Green Input   |
| 30              | BIN         | IN     | Analog Blue Input  |
| 31              | VPROT       | IN     | Vertical Protection Input                                      |
| 32              | SAFETY      | IN     | Safety Input   |
| 33              | HFLB        | IN     | Horizontal Flyback Input                                       |
| 34              | VERTQ/INTLC | OUT    | Differential Vertical Sawtooth Output Interlace Control Output |
| 35              | VERT        | OUT    | Differential Vertical Sawtooth Output                          |
| 36              | EW          | OUT    | Vertical Parabola Output                                       |
| 37              | SENSE       | IN     | Sense ADC Input  |
| 38              | GNDM        | SUPPLY | Ground, MADC Input   |
| 39              | RSW1        | OUT    | Range Switch1 for Measurement ADC                              |
| 40              | RSW2        | OUT    | Range Switch2 for Measurement ADC                              |
| 41              | SVMOUT      | OUT    | Scan Velocity Modulation Output                                |
| 42              | ROUT        | OUT    | Analog Red Output  |
| 43              | GOUT        | OUT    | Analog Green Output  |
| 44              | BOUT        | OUT    | Analog Blue Output   |
| 45              | VSUPAB      | SUPPLY | Supply Voltage, Analog Back-end                                |
| 46              | GNDAB       | SUPPLY | Ground, Analog Back-end  |
| 47              | VRD         | IN     | DAC Reference  |
| 48              | XREF        | IN     | Reference Input for RGB DACs                                   |
| 49              | AIN3        | IN     | Analog Audio 3 Input   |
| 50              | AIN2        | IN     | Analog Audio 2 Input   |
| 51              | AIN1        | IN     | Analog Audio 1 Input   |
| 52              | AOUT2       | OUT    | Analog Audio 2 Output  |
| 53              | AOUT1       | OUT    | Analog Audio 1 Output  |
| 54              | VSUPS       | SUPPLY | Supply Voltage, Standby  |
| 55              | GNDS        | SUPPLY | Ground, Standby  |
| 56              | XTAL1       | IN     | Analog Crystal Input   |
| 57              | XTAL2       | OUT    | Analog Crystal Output  |
| 58              | RESQ        | IN/OUT | Reset Input/Output, Active Low                                 |
| 59              | SCL         | IN/OUT | I 2 C Bus Clock  |
| 60              | SDA         | IN/OUT | I 2 C Bus Data   |
| 61              | Mute        | OUT    | High = Mute active   |
| 62              | LED         | OUT    | High = Green, Low = Red  |
| 63              | KB          | IN     | Local keyboard ADC input                                       |
| 64              | OCF         | IN     | Over Current Protection input                                  |

|    |         |    |          |
|----|---------|----|----------|
| 1  | Power   | 64 | OCP      |
| 2  | AGC     | 63 | KB       |
| 3  | S/B 5V  | 62 | LED      |
| 4  | Gnd     | 61 | MUTE     |
| 5  | MOD SW  | 60 | SDA      |
| 6  | SECAM L | 59 | SCL      |
| 7  | AFC/RES | 58 | RESET    |
| 8  | IR      | 57 | XTAL in  |
| 9  | SC1 SW  | 56 | OSC GND  |
| 10 | SC2 SW  | 55 | GND      |
| 11 | Vout    | 54 | S/B 3.3V |
| 12 | VRT     | 53 |          |
| 13 | SGND    | 52 |          |
| 14 | GND     | 51 | GND      |
| 15 | 5V      | 50 | GND      |
| 16 | Cb in   | 49 | GND      |
| 17 | C in    | 48 | XREF     |
| 18 | Cr in   | 47 | VRD      |
| 19 | IF-IN   | 46 | GND      |
| 20 | SC1-IN  | 45 | 5V       |
| 21 | SC2-IN  | 44 | B out    |
| 22 | RCA VIN | 43 | G out    |
| 23 | TEST    | 42 | R out    |
| 24 | H out   | 41 | SVM out  |
| 25 | 3.3 V   | 40 | RSW2     |
| 26 | GND     | 39 | RSW1     |
| 27 | FBLIN   | 38 | GND      |
| 28 | Rin     | 37 | SENSE    |
| 29 | Gin     | 36 | EW       |
| 30 | Bin     | 35 | VERTQ    |
| 31 | VPROT   | 34 | VERT     |
| 32 | SAFETY  | 33 | HFLB     |

VCT 383X



#### 4-2 MSP341x Multistandard Sound Processor

The MSP 341x is designed as a single-chip Multistandard Sound Processor for applications in analogue and digital TV sets, video recorders, and PC cards.

The MSP3411 has all functions of MSP3410 with the addition of a virtual surround sound feature.

A Surround sound effect can be reproduced with two loudspeakers. The MSP3411 includes virtualizer algorithm "3D Panorama" which has been approved by the Dolby laboratories for compliance with the "Virtual Dolby Surround" technology. In addition, the MSP3411 includes Micronas "Panorama" algorithm.

MSP 341x features :

- sound IF input
- No external filters required
- Stereo baseband input via integrated AD converters
- Two pairs of DA converters
- Two carrier FM or NICAM processing
- AVC : Automatic Volume Correction
- Bass, treble, volume processing
- Full SCART in/out matrix without restrictions
- Improved FM-identification
- Demodulator short programming
- Autodetection for terrestrial TV - sound standards
- Precise bit-error rate indication
- Automatic switching from NICAM to FM/AM or vice versa
- Improved NICAM synchronisation algorithm
- Improved carrier mute algorithm
- Improved AM-demodulation
- Reduction of necessary controlling
- Less external components

#### **4-2-1- Basic Features of the MSP 341x**

##### **4-2-1-1 Demodulator and NICAM Decoder Section**

The MSP 341x is designed to simultaneously perform digital demodulation and decoding of NICAM-coded TV stereo sound, as well as demodulation of FM or AM mono TV sound. Alternatively, two carrier FM systems according to the German terrestrial specs can be processed with the MSP 341x.

The MSP 341x facilitates profitable multistandard capability, offering the following advantages:

- Automatic Gain Control (AGC) for analogue input: input range: 0.10 - 3 Vpp
- integrated A/D converter for sound-IF input
- all demodulation and filtering is performed on chip and is individually programmable
- easy realisation of all digital NICAM standards (B/G, I, L and D/K)
- FM-demodulation of all terrestrial standards (include identification decoding)
- no external filter hardware is required
- only one crystal clock (18.432 MHz) is necessary

- high deviation FM-mono mode (max. deviation: approx.  $\pm 360$  kHz)

### 4-2-1-2 DSP-Section (Audio Baseband Processing)

- flexible selection of audio sources to be processed
- performance of terrestrial de-emphasise systems (FM, NICAM)
- digitally performed FM-identification decoding and de-matrixing
- digital baseband processing: volume, bass, treble
- simple controlling of volume, bass, treble

### 4-2-1-3 Analogue Section

- two selectable analogue pairs of audio baseband input (= two SCART inputs) input level:  $< 2$  V RMS, input impedance:  $> 25$  k $\Omega$
- one selectable analogue mono input (i.e. AM sound): Not used in this chassis
- two high-quality A/D converters, S/N-Ratio:  $> 85$  dB
- 20 Hz to 20 kHz bandwidth for SCART-to-SCART copy facilities
- loudspeaker: one pair of four-fold oversampled D/A converters. Output level per channel: max. 1.4 VRMS output resistance: max. 5 k $\Omega$ . S/N-ratio:  $> 85$  dB at maximum volume Max. noise voltage in mute mode:  $< 10$   $\mu$ V (BW: 20 Hz... 16kHz)
- one pair of four-fold oversampled D/A converters supplying a pair of SCART-outputs. output level per channel: max. 2 V RMS, output resistance: max. 0.5 k $\Omega$ , S/N-Ratio:  $> 85$  dB (20 Hz... 16 kHz)

### 4-2-1-4 NICAM plus FM/AM-Mono

According to the British, Scandinavian, Spanish, and French TV-standards, high-quality stereo sound is transmitted digitally. The systems allow two high-quality digital sound channels to be added to the already existing FM/AM-channel. The sound coding follows the format of the so-called Near Instantaneous Companding System (NICAM 728). Transmission is performed using Differential Quadrature Phase Shift Keying (DQPSK. Table below offers an overview of the modulation parameters.)

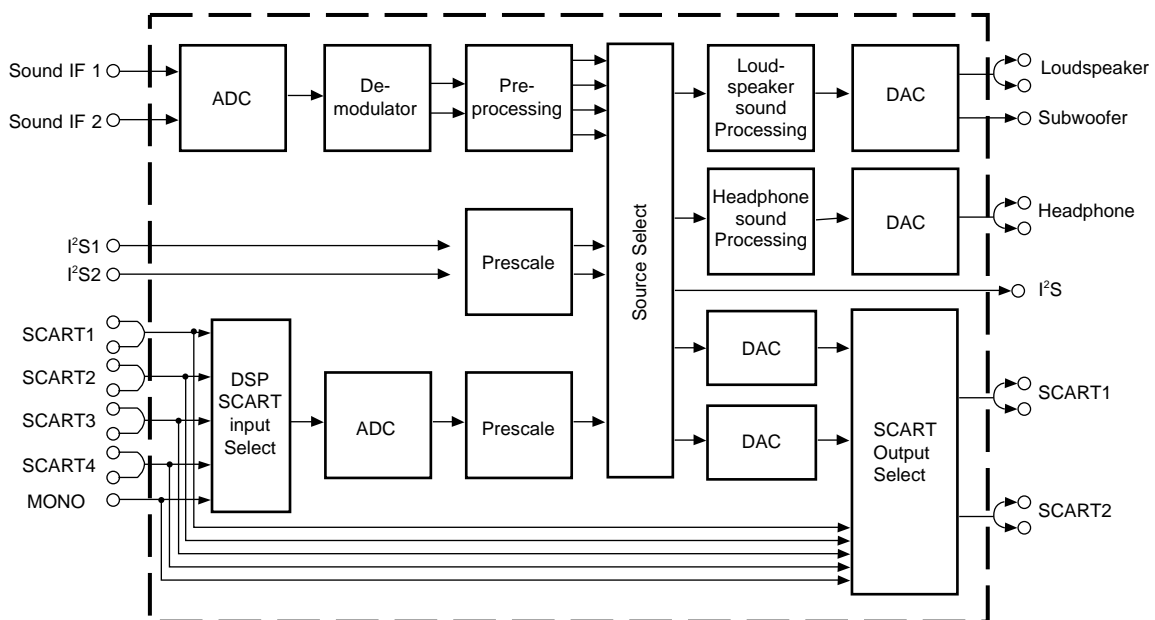
In the case of NICAM/FM (AM) mode, there are three different audio channels available: NICAM A, NICAM B, and FM/AM-mono. NICAM A and B may belong either to a stereo or to a dual language transmission. Information about operation mode and about the quality of the NICAM signal can be read by the controlling software via the control bus. In the case of low quality (high bit error rate), the controlling software may decide to switch to the analogue FM/AM-mono sound. Alternatively, an automatic NICAM-FM/AM switching may be applied.

### 4-2-1-5 German 2-Carrier System (DUAL FM System)

Since September 1981, stereo and dual sound programs have been transmitted in Germany using the 2-carrier system. Sound transmission consists of the already existing first sound carrier and a second sound carrier additionally containing an identification signal. More details of this standard are given in Tables below. For D/K very similar system is used.

TV standards

| TV system | Position of sound carrier (MHz)                                      | Sound modulation                 | Color system | Country             |
|-----------|--|----------------------------------|--------------|---------------------|
| B/G       | 5.5 / 5.7421875  | FM Stereo                        | PAL          | Germany             |
| B/G       | 5.5 / 5.85   | FM-Mono / NICAM                  | PAL          | Scandinavia, Spain  |
| L         | 6.5 / 5.85   | AM-Mono / NICAM                  | SECAM-L      | France              |
| I         | 6.0 / 6.552  | FM-Mono / NICAM                  | PAL          | UK                  |
| D/K       | 6.5 / 6.2578125 D/K1<br>6.5 / 6.7421875 D/K2<br>6.5 / 5.85 D/K-NICAM | FM Stereo<br><br>FM-Mono / NICAM | SECAM-East   | USSR<br><br>Hungary |



Architecture of MSP341x

Pin connections and short description

| Pin No. | Pin Name | Type     | Short description      |
|---------|----------|----------|------------------------|
| 1       | TP       | Out      | Test pin               |
| 2       | NC       |          | Not Connected          |
| 3       | NC       |          | Not Connected          |
| 4       | TP       | Out      | Test pin               |
| 5       | TP       | Out      | Test pin               |
| 6       | ADR_SEL  | In       | I2C bus Address select |
| 7       | STANDBYQ | In       | Standby ( Low-active)  |
| 8       | NC       |          | Not Connected          |
| 9       | I2C_CL   | In / Out | I2C Clock              |
| 10      | I2C_DA   | In / Out | I2C data               |
| 11      | TP       | In / Out | Test pin               |

| Pin No. | Pin Name  | Type     | Short description                          |
|---------|-----------|----------|--|
| 12      | TP        | In / Out | Test pin                                   |
| 13      | TP        | Out      | Test pin                                   |
| 14      | NC        |          | Not Connected                              |
| 15      | TP        | Out      | Test pin                                   |
| 16      | TP        | Out      | Test pin                                   |
| 17      | TP        | Out      | Test pin                                   |
| 18      | DVSUP     |          | Digital power supply +5V                   |
| 19      | DVSS      |          | Digital Ground                             |
| 20      | NC        |          | Not Connected                              |
| 21      | NC        |          | Not Connected                              |
| 22      | NC        |          | Not Connected                              |
| 23      | NC        |          | Not Connected                              |
| 24      | RESETQ    | In       | Power-On-reset                             |
| 25      | NC        |          | Not Connected                              |
| 26      | NC        |          | Not Connected                              |
| 27      | VREF2     |          | Reference ground 2 high voltage part       |
| 28      | DACM_R    | Out      | Loudspeaker out Right                      |
| 29      | DACM_L    | Out      | Loudspeaker out Left                       |
| 30      | NC        |          | Not Connected                              |
| 31      | TP        | Out      | Test pin                                   |
| 32      | NC        |          | Not Connected                              |
| 33      | NC        |          | Not Connected                              |
| 34      | NC        |          | Not Connected                              |
| 35      | VREF1     |          | Reference ground 1 high voltage part       |
| 36      | SC1_OUT_R | Out      | Scart output 1, right                      |
| 37      | SC1_OUT_L | Out      | Scart output 1, left                       |
| 38      | NC        |          | Not Connected                              |
| 39      | AHVSUP    |          | Analog power supply 8.0V                   |
| 40      | CAPL_M    |          | Volume capacitor MAIN                      |
| 41      | AHVSS     |          | Analog ground                              |
| 42      | AGNDC     |          | Analog reference voltage high voltage part |
| 43      | NC        |          | Not Connected                              |
| 44      | NC        |          | Not Connected                              |
| 45      | NC        |          | Not Connected                              |
| 46      | NC        |          | Not Connected                              |
| 47      | NC        |          | Not Connected                              |
| 48      | ASG2      |          | Analog Shield Ground 2                     |
| 49      | SC2_IN_L  | In       | Scart input 2 in, left                     |
| 50      | SC2_IN_R  | In       | Scart input 2 in, right                    |
| 51      | ASG1      |          | Analog Shield Ground 1                     |
| 52      | SC1_IN_L  | In       | Scart input 1 in, left                     |
| 53      | SC1_IN_R  | In       | Scart input 1 in, right                    |
| 54      | VREFTOP   |          | Reference voltage IF A/D converter         |
| 55      | MONO_IN   | In       | Mono input                                 |
| 56      | AVSS      |          | Analog ground                              |
| 57      | AVSUP     |          | Analog power supply                        |
| 58      | ANA_IN1+  |          | In IF input 1                              |

| Pin No. | Pin Name | Type | Short description  |
|---------|----------|------|--------------------|
| 59      | ANA_IN1- | In   | IF common          |
| 60      | NC       |      | Not Connected      |
| 61      | TESTEN   | In   | Test pin           |
| 62      | XTAL_IN  | In   | Crystal oscillator |
| 63      | XTAL_OUT | Out  | Crystal oscillator |
| 64      | NC       |      | Test pin           |

#### 4-3 TDA 4470-Multistandard Video-IF and Quasi Parallel Sound Processor

##### 4-3-1- Description

The TDA 4470 is an integrated bipolar circuit for multi-standard video/sound IF (VIF/SIF) signal processing in TV/VCR and multimedia applications. The circuit processes all TV video IF signals with negative modulation (e.g., B/G standard), positive modulation (e.g., L standard) and the AM, FM/NICAM sound IF signals.

##### 4-3-2- Features

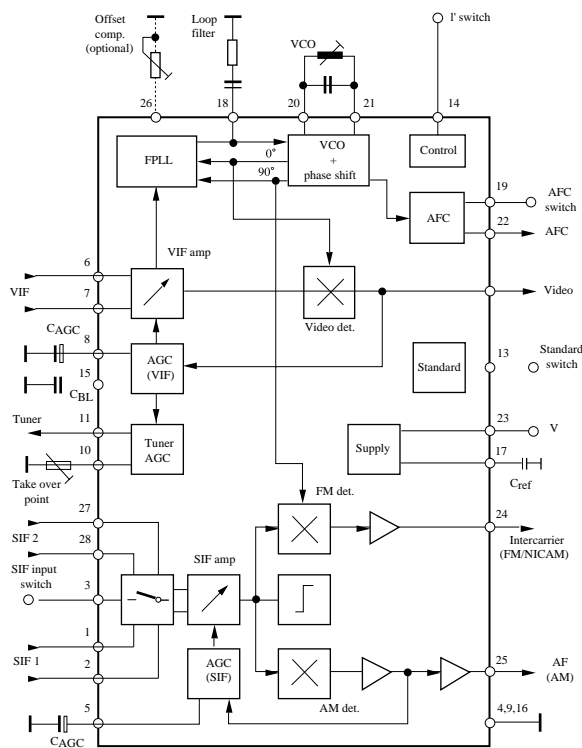
- 5V supply voltage ; low power consumption.
- Active carrier generation by FPLL principle (frequency-phase-locked-loop) for true synchronous demodulation.
- Very linear video demodulation, good pulse response and excellent intermodulation figures.
- Alignment-free AFC without external reference circuit, polarity of the AFC curve is switchable.
- VIF-AGC for negative modulated signals (peak sync. detection) and for positive modulation (peak white/black level detector).
- Tuner AGC with adjustable take over point.
- Alignment-free quasi parallel sound (QPS) mixer for FM/NICAM sound IF signals.
- Intercarrier output signal is gain controlled (necessary for digital sound processing).
- Complete alignment-free AM demodulator with gain controlled AF output.
- Separate SIF-AGC with average detection
- Two independent SIF inputs
- Parallel operation of the AM demodulator and QPS mixer (for NICAM-L stereo sound).

##### 4-3-3- Pinning

| Pin    | Symbol       | Function                   |
|--------|--------------|----------------------------|
| 1,2    | $V_{i,SIF1}$ | SIF1 input ( symmetrical)  |
| 3      | $V_{SW}$     | Input selector switch      |
| 4,9,16 | GND          | Ground                     |
| 5      | $V_{AGC}$    | SIF-AGC (time constant)    |
| 6,7    | $V_{i,VIF}$  | VIF input (symmetrical)    |
| 8      | $C_{AGC}$    | VIF-AGC (time constant)    |
| 10     | $R_{TOP}$    | Take Over Point, tuner AGC |
| 11     | $I_{tun}$    | Tuner AGC output current   |
| 12     | $V_{O,VID}$  | Video output               |
| 13     | $V_{SW}$     | Standard switch            |
| 14     | $V_{SW}$     | Lswitch                    |
| 15     | $C_{bl}$     | Black level capacitor      |
| 17     | $C_{ref}$    | Internal reference voltage |
| 18     | LF           | Loop Filter                |

| Pin    | Symbol       | Function                 |
|--------|--------------|--------------------------|
| 19     | $V_{SW}$     | AFC switch               |
| 20, 21 | $V_{VCO}$    | VCO circuit              |
| 22     | $V_{AFC}$    | AFC output               |
| 23     | $V_S$        | Supply voltage           |
| 24     | $V_{O,FM}$   | Intercarrier output      |
| 25     | $V_{O,AM}$   | AF output-AM sound       |
| 26     | $R_{COMP}$   | Offset compensation      |
| 27, 28 | $V_{i,SIF2}$ | SIF2 input (symmetrical) |

4-3-4 Block diagram



#### 4-4 TDA8946J Stereo Audio Amplifier

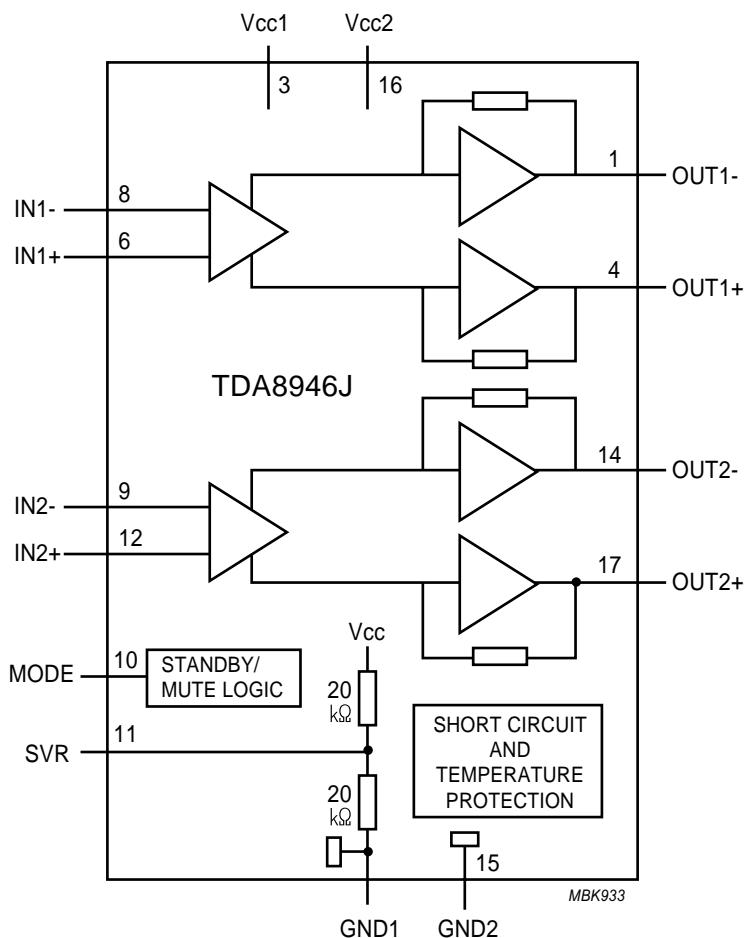
The TDA8946J is a dual-channel audio power amplifier with an output power of 2 X 15W at an 8Ω load and a 18V supply. The circuit contains two Bridges Tied Load(BTL) amplifiers with an all-NPN output stage and standby/mute logic. The TDA8946J comes in a 17-pin DIL power package.

##### 4-4-1- Features

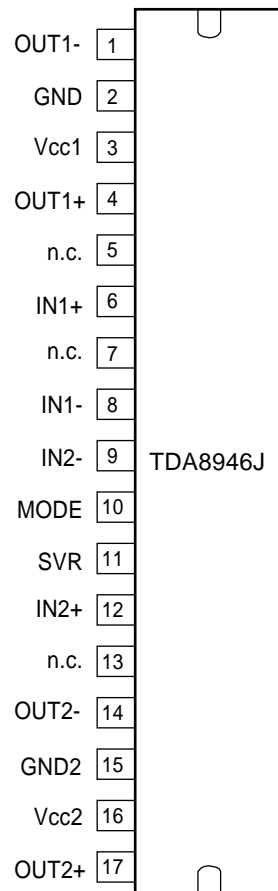
- Few external components
- Fixed gain
- Standby and mute mode
- No on/off switching pop noise
- low standby current
- High supply voltage ripple rejection
- Outputs short-circuit protected to ground, supply and across the load
- Thermally protected

##### Pin description

| Pin | Symbol | Description                                       |
|-----|--------|---|
| 1   | OUT1-  | negative loudspeaker terminal 1                   |
| 2   | GND1   | ground channel 1                                  |
| 3   | Vcc1   | supply voltage channel 1                          |
| 4   | OUT1+  | positive loudspeaker terminal 1                   |
| 5   | n.c.   | not connected                                     |
| 6   | IN1+   | positive input1                                   |
| 7   | n.c.   | not connected                                     |
| 8   | IN1-   | negative input1                                   |
| 9   | IN2-   | negative input2                                   |
| 10  | MODE   | mode selection input                              |
| 11  | SVR    | half supply voltage decoupling (ripple rejection) |
| 12  | IN2+   | positive input2                                   |
| 13  | n.c    | not connected                                     |
| 14  | OUT2-  | negative loudspeaker terminal 2                   |
| 15  | GND2   | ground channel 2                                  |
| 16  | Vcc2   | supply voltage channel 2                          |
| 17  | OUT2+  | positive loudspeaker terminal 2                   |



Block diagram TDA8946J



Pin configuration

#### 4-5 TDA8358J Vertical Amplifier

The TDA8358J are power circuit for use in 90° and 110° colour deflection systems for field frequencies of 25 to 200Hz and 16/9 picture tubes. The circuit provides a DC driven vertical deflection output circuit, operating as a highly efficient class G system. Due to the full bridge output circuit the deflection coils can be DC coupled.

The IC is constructed in a Low Voltage DMOS process that combines Bipolar, CMOS and DMOS devices. MOS transistors are used in the output stage because of the absence of second breakdown.

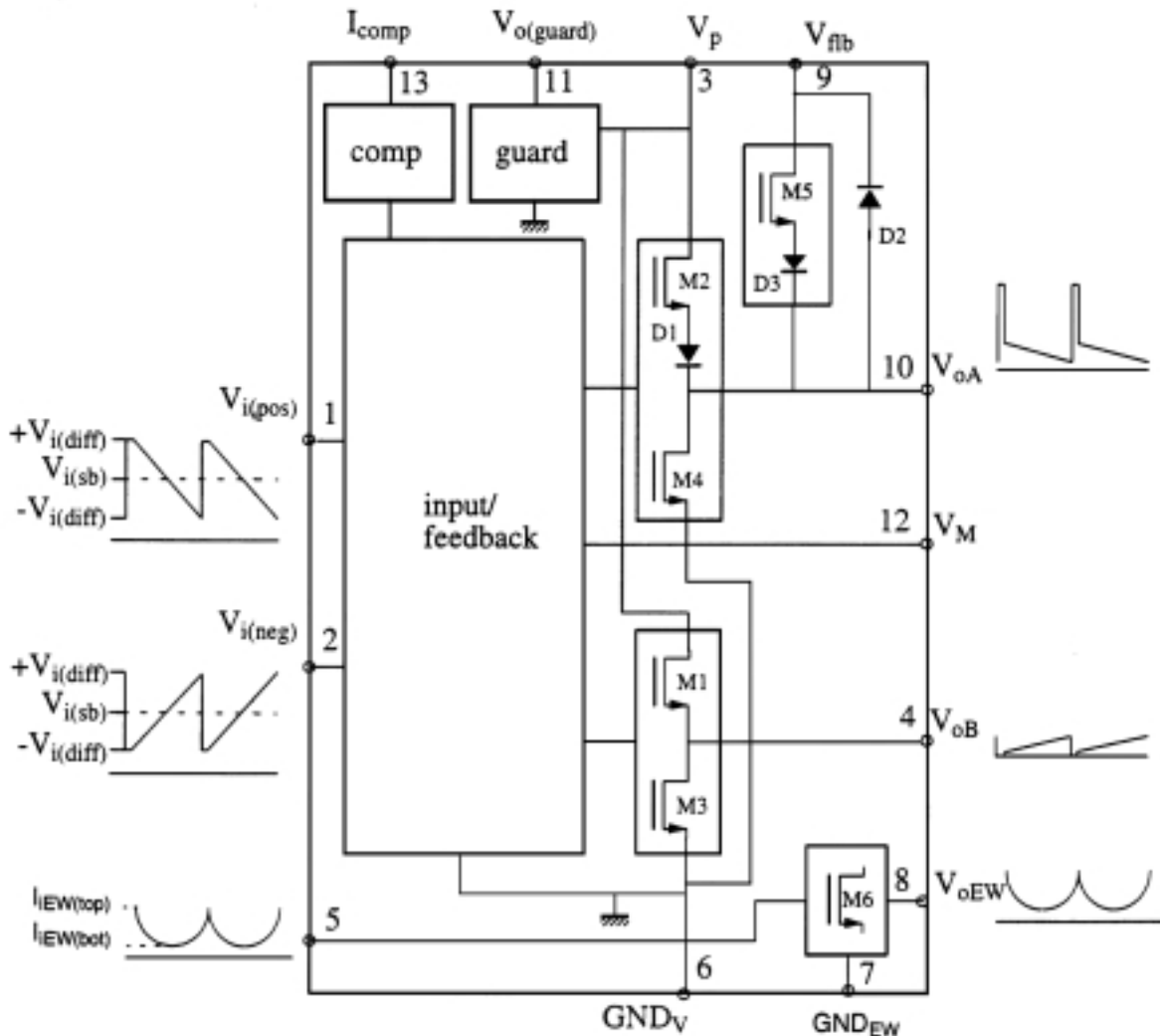
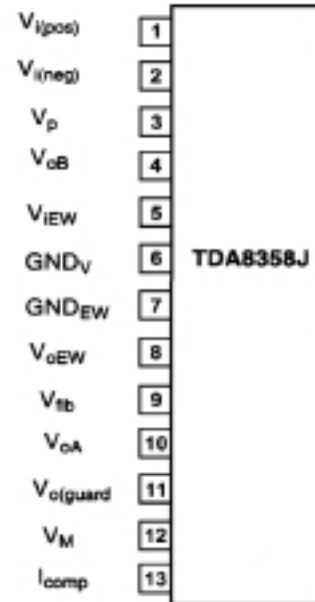


4-5-1 TDA8358J

An East-West output stage is provided that is able to sink current from the diode modulator circuit.

Features :

- Few external components
- Highly efficient fully DC-coupled vertical output bridge circuit
- Short rise and fall time of the vertical flyback switch
- Guard circuit
- Temperature (thermal) protection
- High EMC because of common mode inputs
- East-West output stage



4-6 TDA6107Q

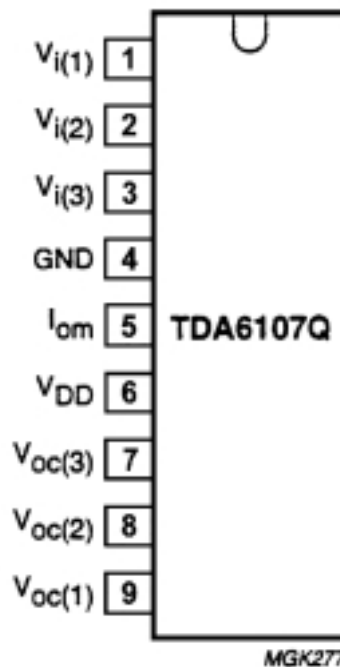
The TDA6107Q includes three video output amplifiers in one plastic DIL-Bent-SIL 9-pin medium power package, using high voltage DMOS technology, and is intended to drive the three cathodes of a colour CRT directly. To obtain maximum performance, the amplifier should be used with black-current control.

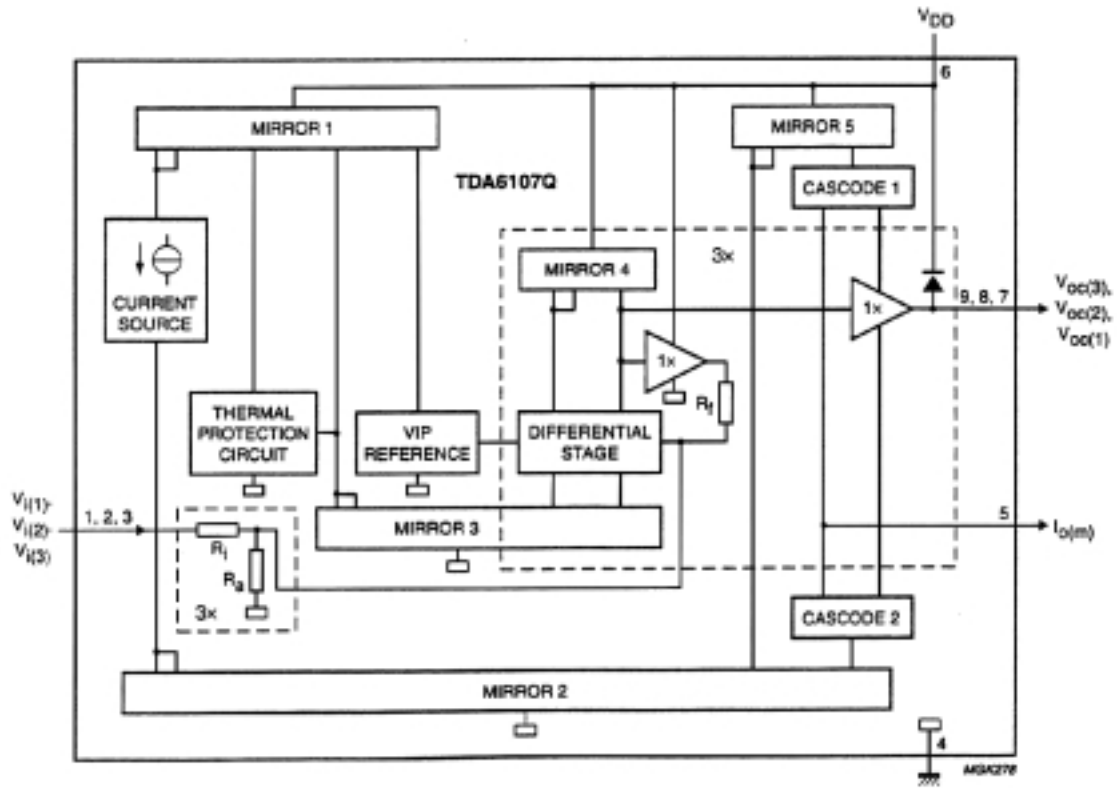
Features

- Typical bandwidth of 5.5 MHz for an output signal of 60 Vpp
- High slew rate of 900V/ $\mu$ s
- No external components required
- Very simple application
- Single supply voltage of 200V
- Internal reference voltage of 2.5 V
- Fixed gain of 50.
- Black-current stabilisation (BCS) circuit
- Thermal protection

Pin description

| Pin | Symbol      | Description                      |
|-----|-------------|----------------------------------|
| 1   | $V_{i(1)}$  | inverting input 1                |
| 2   | $V_{i(2)}$  | inverting input 2                |
| 3   | $V_{i(3)}$  | inverting input 3                |
| 4   | GND         | ground (fin)                     |
| 5   | $I_{om}$    | black current measurement output |
| 6   | $V_{DD}$    | supply voltage                   |
| 7   | $V_{oc(3)}$ | cathode output 3                 |
| 8   | $V_{oc(2)}$ | cathode output 2                 |
| 9   | $V_{oc(1)}$ | cathode output 1                 |





Block diagram TDA6107Q

### 4-7 24C16 - 16 Kb EEPROM

features :

- 16 Kbit serial I2C bus EEPROM
- Single supply voltage : 4.5 V to 5.5 V
- 1 Million Erase/Write cycles (minimum)
- 40 year data retention (minimum)

Pin description

| Pin No. | Name       | Description                      |
|---------|------------|----------------------------------|
| 1, 2, 3 | E0, E1, E2 | Device address - not used        |
| 5       | SDA        | Serral Data/Address Input/Output |
| 6       | SCL        | Serial clock                     |
| 7       | WC         | Write control                    |
| 8       | Vcc        | Supply voltage                   |
| 4       | Vss        | Ground                           |

The memory device is compatible with the I2C memory standard. This is a two wire serial interface that uses a bi-directional data bus and serial clock. The memory carries a built-in 4-bit unique device type identifier code (1010) in accordance with the I2C bus definition.

Serial Clock (SCL)

The SCL input is used to strobe all data in and out of the memory.

Serial Data (SDA)

The SDA pin is bi-directional, and is used to transfer data in or out of the memory

4-8 STR - F6653

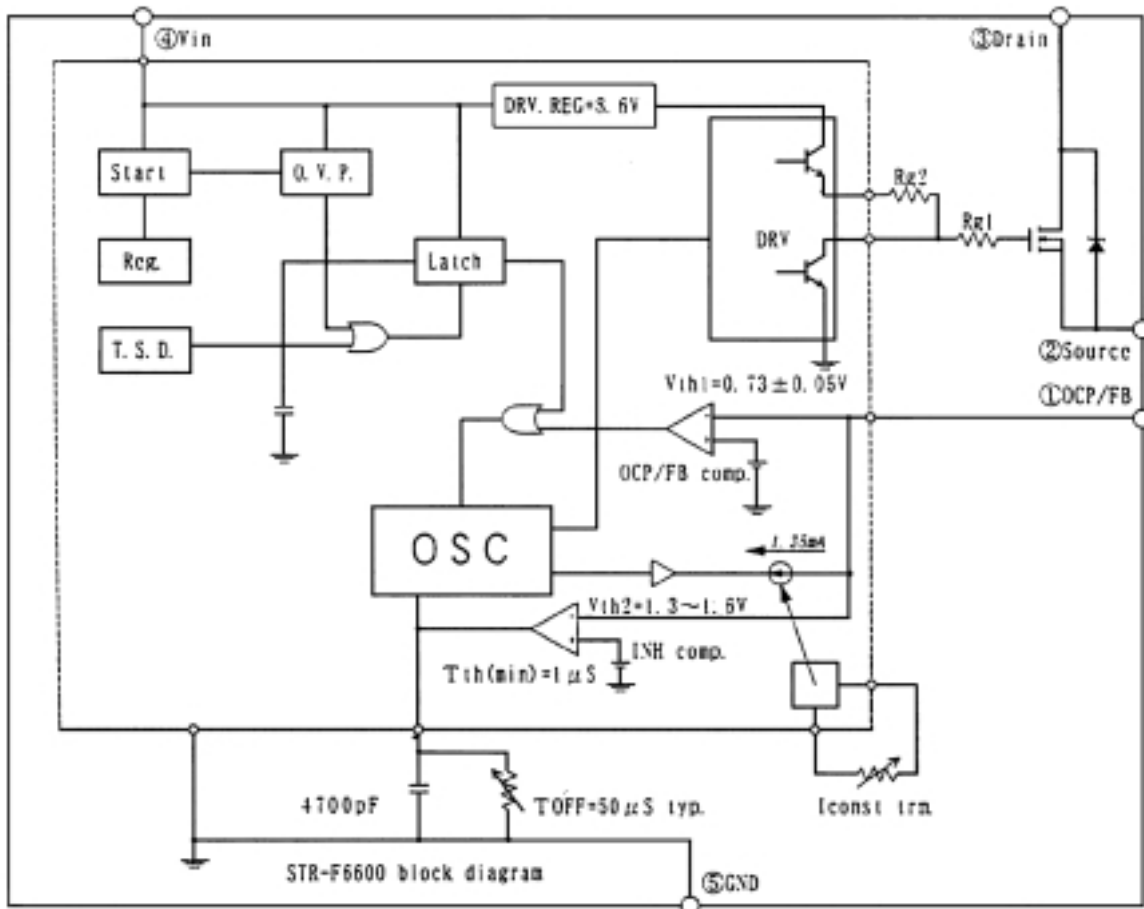
4-8-1 General description

The STR-F6653 is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

4-8-2 Features

- Small SIP fully isolated molded 5 pins package
- Many protection functions :
  - \* Pulse-by-pulse overcurrent protection (OCP)
  - \* Overvoltage protection with latch mode (OVP)
  - \* Thermal protection with latch mode (TSD)

4-8-3 Block diagram



## Service manual SC-150

### 4-8-4 Pins description

| pin | name                   | symbol          | description  |
|-----|------------------------|-----------------|--|
| 1   | Overcurrent / feedback | O.C.P./ F.B.    | Input of over current detection signal and feedback signal |
| 2   | Source                 | S               | MOSFET source  |
| 3   | Drain                  | D               | MOSFET drain   |
| 4   | Supply                 | V <sub>IN</sub> | Input of power supply for control circuit                  |
| 5   | Ground                 | GND             | Ground   |

### 4-8-5 Control part electrical characteristics

| DESCRIPTION                                      | IC PIN NUMBER | SYMBOL                   | RATING |      |        | UNIT |
|--|---------------|--------------------------|--------|------|--------|------|
|  |               |                          | MIN.   | TYPE | MAX    |      |
| Operation start voltage                          | 4-5           | V <sub>IN</sub> (on)     | 14.4   | 16   | 17.6   | V    |
| Operation stop voltage                           | 4-5           | V <sub>IN</sub> (off)    | 9      | 10   | 111    | V    |
| Circuit current in operation                     | 4-5           | I <sub>IN</sub> (on)     | -      | -    | 30     | mA   |
| Circuit current in non-operation                 | 4-5           | I <sub>IN</sub> (off)    | -      | -    | 100 mA | μA   |
| Maximum OFF time                                 | -             | T <sub>OFF</sub> (max)   | 45     | -    | 55     | μSEC |
| Minimum time for input of quaxi resonant signals | 1-5           | T <sub>TH</sub> (2)      | -      | -    | 1.0    | μSEC |
| Minimum off time                                 | -             | T <sub>OFF</sub> (min)   | -      | -    | 1.5    | μSEC |
| O.C.P./F.B. terminal threshold voltage 1         | 1-5           | V <sub>TH</sub> (1)      | 0.68   | 0.73 | 0.78   | V    |
| O.C.P./F.B. terminal threshold voltage 2         | 1-5           | V <sub>TH</sub> (2)      | 1.3    | 1.45 | 1.6    | V    |
| O.C.P./F.B. terminal extraction current          | 1-2           | I <sub>OCP/FB</sub>      | 1.2    | 1.35 | 1.5    | mA   |
| O.V.P. operation voltage                         | 4-5           | V <sub>IN</sub> (OVP)    | 20.5   | 22.5 | 24.5   | V    |
| Latch circuit sustaining voltage                 | 4-5           | I <sub>IN</sub> (H)      | -      | -    | 400    | μA   |
| Latch circuit release voltage                    | 4-5           | V <sub>IN</sub> (La.off) | 6.6    | -    | 8.4    | V    |
| Thermal shutdown operating temperature           | -             | T <sub>J</sub> (TSD)     | 140    | -    | -      | °C   |

4-8-6 MOSFET electrical characteristics

| DESCRIPTION                   | IC PINS NUMBER | SYMBOL        | RATING |      |      | UNIT          |
|-------------------------------|----------------|---------------|--------|------|------|---------------|
|                               |                |               | MIN.   | TYPE | MAX  |               |
| Drain-to-source break voltage | 3-2            | $V_{DSS}$     | 650    | -    | -    | V             |
| Drain leakage current         | 3-2            | $I_{DSS}$     | -      | -    | 300  | $\mu A$       |
| On-resistance                 | 3-2            | $R_{DS} (on)$ | -      | -    | 1.95 | $\Omega$      |
| Switching time                | 3-2            | tf            | -      | - 2  | 50   | noec          |
| Thermal resistance            | -              | $O_{CH} -F$   | -      | -    | 0.95 | $^{\circ}C/W$ |

4-9 CXA1315P

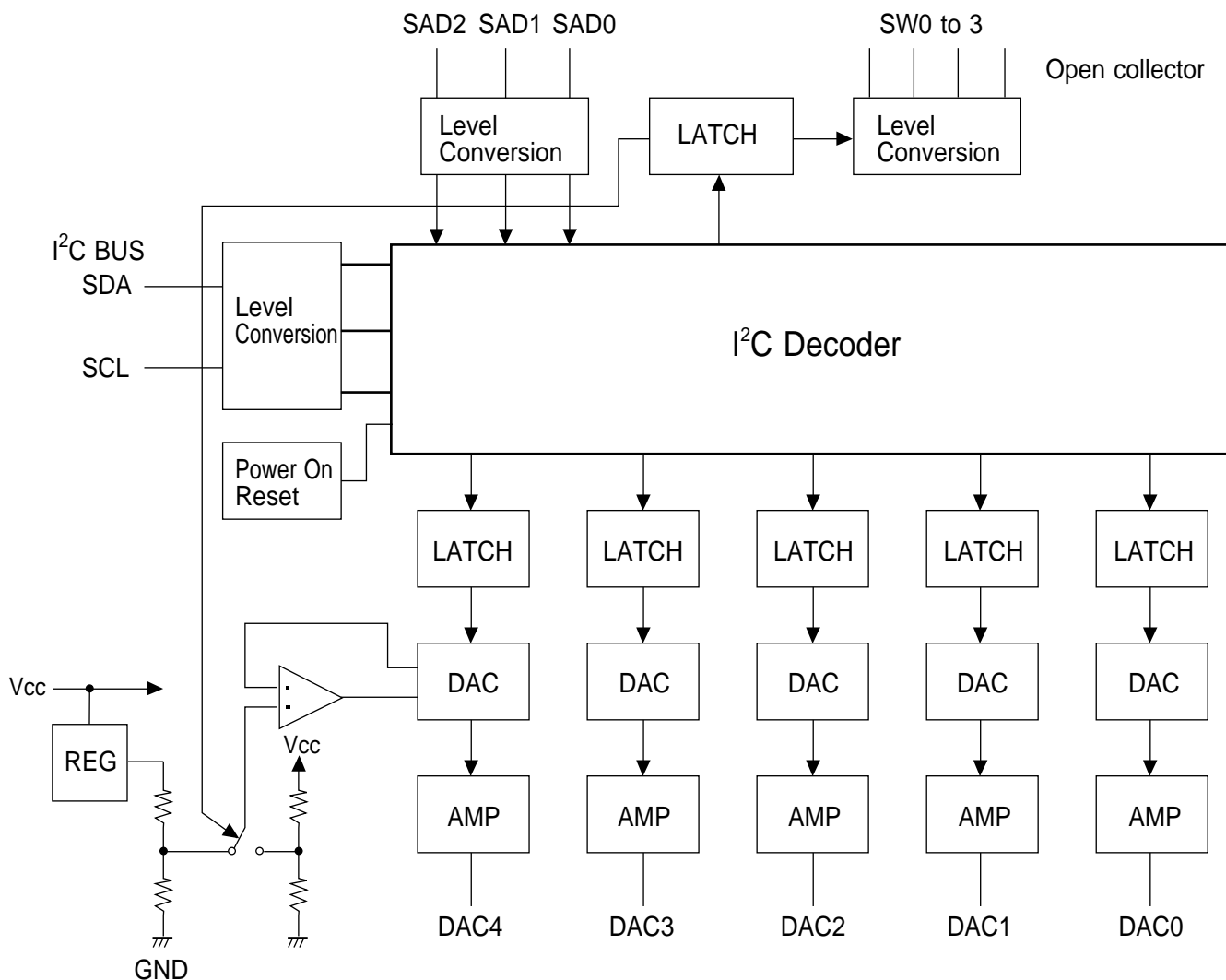
4-9-1 General description

The CXA1315M/P is developed as a 5-channel 8-bit D/A converter supporting with I<sup>2</sup>C bus.

4-9-2 Features

- Serial control through I<sup>2</sup>C bus
- 5-channel 8-bit D/A converter
- Built-in 4 general-purpose I/O ports (Digital I/O)
- I/O can be specified to respective ports independently
- Selection of 8 slave addresses possible through address select pins (3 pins)

4-9-3 Block diagram





4-9-4 Pin Description

| Pin | Symbol | Description                          |
|-----|--------|--------------------------------------|
| 1   | SW1    | I/O pin for general purpose I/O port |
| 2   | SW0    | VILmax: 1.5V                         |
| 9   | SW2    | VIHmin: 3V                           |
| 10  | SW3    | VOLmax: 0.4V                         |
| 3   | DAC4   | D/A converter output pin             |
| 4   | DSC3   |                                      |
| 5   | DAC2   |                                      |
| 6   | DAC1   |                                      |
| 7   | DAC0   |                                      |
| 10  | GND    | GND pin                              |
| 11  | SDA0   | Slave address input pin              |
| 12  | SDA1   | Input at positive logic              |
| 13  | SDA2   | VILmax: 1.5V<br>VIHmin: 3V           |
| 15  | SCL    | SCL input pin for I2C bus            |
| 16  | Vcc    | Power supply pin                     |

# Service manual SC-150

## 4-10 MM1118

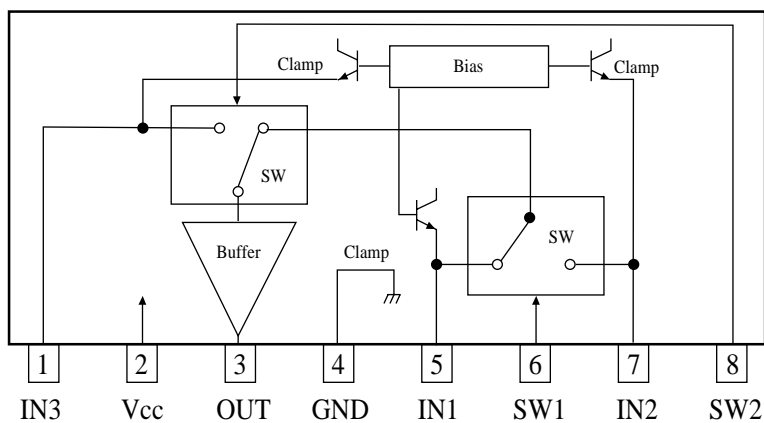
### 4-10-1 General description

This is a 3-input, 1-output video switch IC with a clamp function and built-in 6dB amp, for video signal switching. One of the inputs also has a mute function.

### 4-10-2 Features

- Built-in 6dB amp
- Clamp function
- Mute function
- Current consumption: 5.1mA typ.
- Operating power supply voltage range: 4.6~13.0V
- Frequency response: 10MHz
- Crosstalk: 64dB (at 4.43MHz)

### 4-10-3 Block diagram



Control input truth table

| SW1 | SW2 | OUT |
|-----|-----|-----|
| L   | L   | IN1 |
| H   | L   | IN2 |
| "   | H   | IN3 |

### 4-10-4 Pin Description

| Pin | Symbol | Description  |
|-----|--------|--------------|
| 5   | IN1    | Input1       |
| 7   | IN2    | Input2       |
| 1   | IN3    | Input3       |
| 6   | SW1    | Switch1      |
| 8   | SW2    | Switch2      |
| 2   | Vcc    | Power supply |
| 3   | OUT    | Output       |
| 4   | GND    | Ground       |

4-11 LA6515

4-11-1 General description

The LA6515 features an on-chip current limiter and provides high voltage gain and a high common-mode rejection ratio.

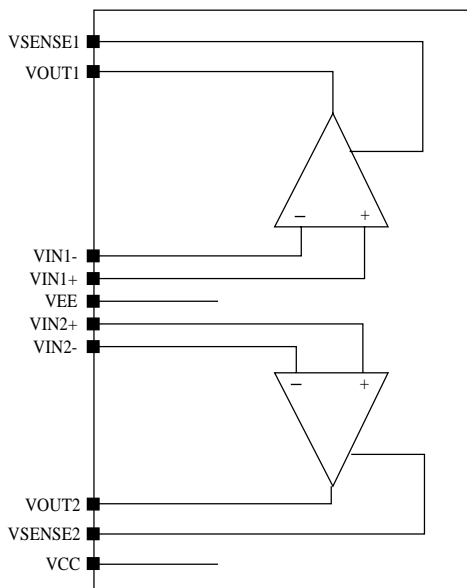
The LA6515 is an ideal choice for power applications such as DC servos, capstan drivers, actuator drivers, programmable power supplies and high-quality audio amplifiers.

The LA6515 is available in 10-pin SIPs and operates from -15V and 15V supplies.

4-11-2 Features

- 0.5A output current
- 100dB voltage gain
- 80dB common-mode rejection
- 0.15V/us slew rate
- 2mV offset voltage
- 10nA offset current
- On-chip current limiter
- 15V and 15V supplies

4-11-3 Block diagram

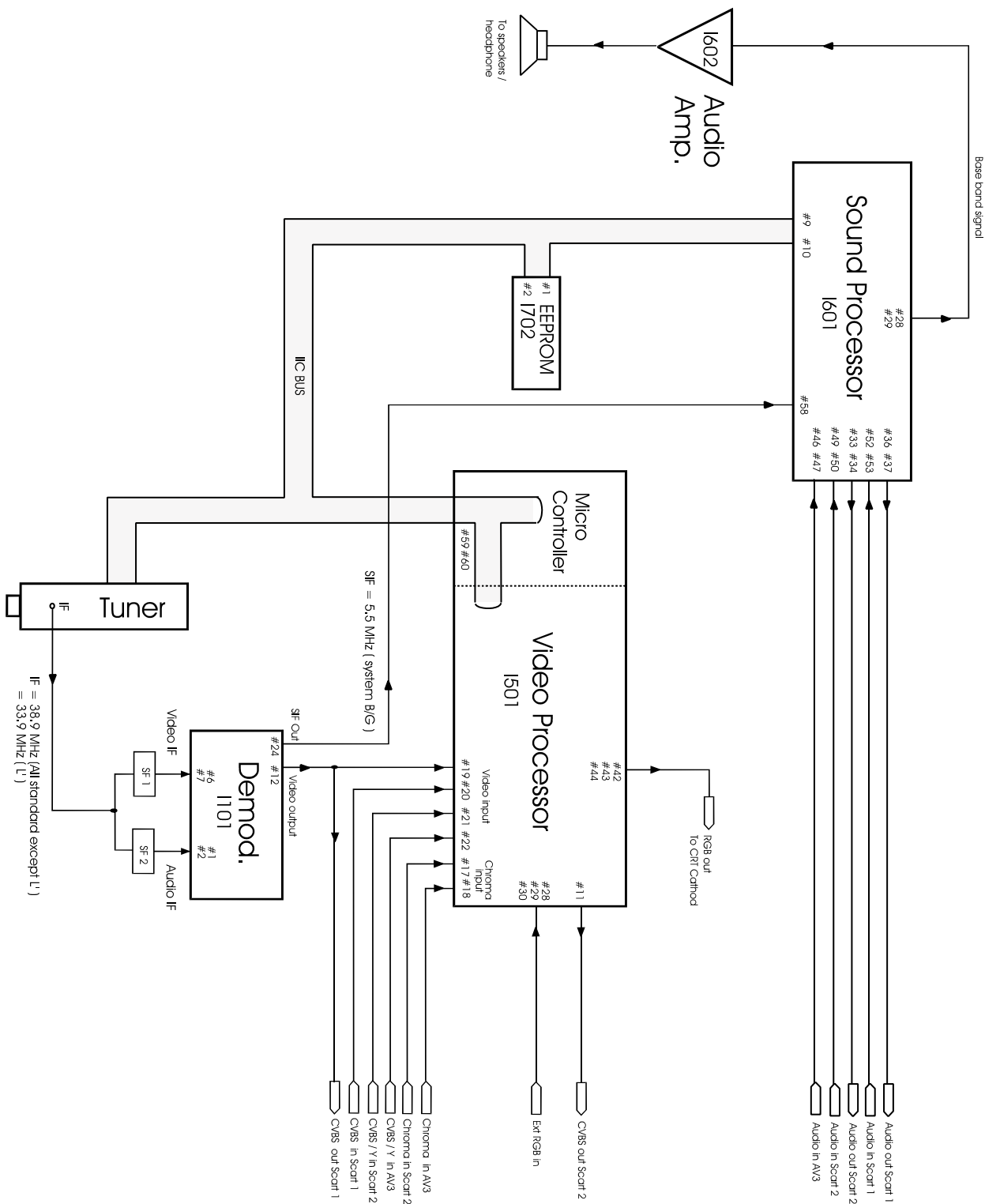


4-11-4 Pin Description

| Pin | Symbol  | Description         |
|-----|---------|---------------------|
| 1   | VSENSE1 | Voltage detect      |
| 2   | OUT1    | Output              |
| 3   | V1-     | Inverting input     |
| 4   | V1+     | Non-inverting input |
| 5   | VEE     | -15V supply         |
| 6   | V2+     | Non-inverting input |
| 7   | V2-     | Inverting input     |
| 8   | OUT2    | Output              |
| 9   | VSENSE2 | Voltage detect      |
| 10  | Vcc     | 15V supply          |

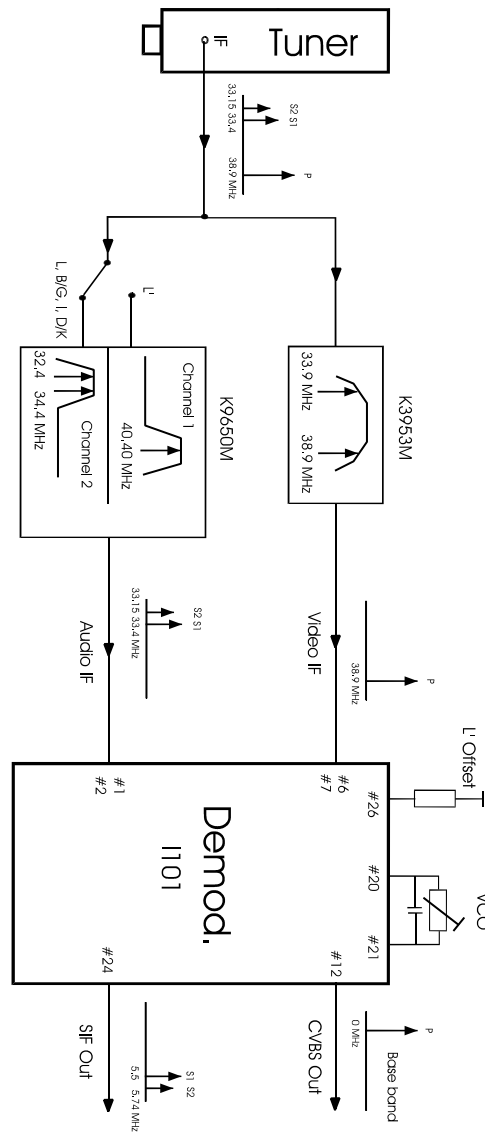
5 - Circuit description

5-1 Block diagram



5-2 IF section

5-2-1 Block diagram



5-2-2 Vision IF Amplifier

The video IF signal (VIF) is fed through a SAW filter to the differential input (Pin 6-7) of the VIF amplifier. This amplifier consists of three AC-coupled amplifier stages. Each differential amplifier is gain controlled by the automatic gain control circuit (VIF-AGC). The output signal of the VIF amplifier is applied to the FPLL carrier generation and the video demodulator.

SAW filters

| Ref.   | Standard             | Features  |
|--------|----------------------|---|
| K3953M | B/G - D/K - I - L/L' | <ul style="list-style-type: none"> <li>- IF filter for video application</li> <li>- TV IF filter with Nyquist slopes at 33.9 MHz and 38.9 MHz</li> <li>- Constant group delay</li> </ul>  |
| K9650M | B/G - D/K - I - L/L' | <ul style="list-style-type: none"> <li>- IF filter for audio application</li> <li>- TV IF audio filter with two channels</li> <li>- Channel 1 (L' ) with one pass band for sound carrier at 40.40 MHz</li> <li>- Channel 2 ( L, D/K, I, B/G) with one pass band for sound carriers between 32.40 MHz and 33.40 MHz</li> </ul> |

5-2-3 Tuner-and VIF-AGC

At Pin 8, the VIF-AGC charges/discharges the AGC capacitor to generate a control Voltage for setting the gain of the VIF amplifier and tuner in order to keep the video output signal at a constant level. Therefore, in the case of all negative modulated signals (e.g., B/G standard) the sync. level of the demodulated video signal is the criterion for a fast charge/discharge of the AGC capacitor. For positive modulation (e.g., L standard) the peak white level of video signal controls the charge current. In order to reduce reaction time for positive modulation, where a large time constant is needed, an additional black level detector controls the discharge current in the event of decreasing VIF input signal. The control voltage (AGC voltage at Pin 8) is transferred to an internal control signal, and is fed to the tuner AGC to generate the tuner AGC current at Pin 11 (open collector output). The take over point of the tuner AGC can be adjusted at Pin 10 by a potentiometer or an external dc voltage (from interface circuit or microprocessor).

5-2-4 FPLL, VCO and AFC

The FPLL circuit (frequency phase locked loop) consists of a frequency and phase detector to generate the control voltage for the VCO tuning. In locked mode, the VCO is controlled by the phase detector and in unlocked mode, the frequency detector is superimposed. The VCO operates with an external resonance circuit (L and C parallel) and is controlled by internal varicaps. The VCO control voltage is also converted to a current and represents the AFC output signal at Pin 22. At the AFC switch (Pin 19) three operating conditions of the AFC are possible: AFC curve “rising” or “falling” and AFC “off”. A practicable VCO alignment of the external coil is the adjustment to zero AFC output current at Pin 22. At center frequency the AFC output current is equal to zero. Furthermore, at Pin 14, the VCO center frequency can be switched for setting to the required L' value (L' standard). The optional potentiometer at Pin 26 allows an offset compensation of the VCO phase for improved sound quality (fine adjustment). Without a potentiometer (open circuit at Pin 26), this offset compensation is not active. The oscillator signal passes a phase shifter and supplies the in-phase signal (0°) and the quadrature signal (90°) of the generated picture carrier.

#### 5-2-5 Video Demodulation and Amplifier

The video IF signal, which is applied from the gain controlled IF amplifier, is multiplied with the in-phase component of the VCO signal. The video demodulator is designed for low distortion and large bandwidth. The demodulator output signal passes an integrated low pass filter for attenuation of the residual vision carrier and is fed to the video amplifier. The video amplifier is realised by an operational amplifier with internal feedback and 8 MHz bandwidth ( $-3$  dB). A standard dependent dc level shift in this stage delivers the same sync. level for positive and negative modulation. An additional noise clipping is provided. The video signal is fed to VIF-AGC and to the video output buffer. This amplifier with a 6 dB gain offers easy adaptation of the sound trap. For nominal video IF modulation the video output signal at Pin 12 is 2 Vpp.

#### 5-2-6 Sound IF Amplifier and SIF-AGC

The SIF amplifier is nearly identical with the 3-stage VIF amplifier. Only the first amplifier stage exists twice and is switchable by a control voltage at Pin 3. Therefore with minimal external expense it is possible to switch between two different SAW filters. Both SIF inputs features excellent cross-talk attenuation and an input impedance which is independent from the switching condition. The SIF-AGC is related to the average level of AM- or FM-carrier and controls the SIF amplifier to provide a constant SIF signal to the AM demodulator and QPS mixer.

#### 5-2-7 Quasi-Parallel-Sound (QPS) Mixer

The QPS mixer is realised by a multiplier. The SIF signal (FM or NICAM carrier) is converted to the intercarrier frequency by the regenerated picture carrier (quadrature signal) which is provided from the VCO. The intercarrier signal is fed via an output amplifier to Pin 24.

#### 5-2-8 Standard Switch

To have equal polarity of the video output signal the polarity can be switched in the demodulation stage in accordance with the TV standard. Additionally a standard dependent dc level shift in the video amplifier delivers the same sync. level. In parallel to this, the correct VIF-AGC is selected for positive or negative modulated VIF signals. In the case of negative modulation (e.g., B/G standard) the AM output signal is switched off. For positive modulation (L standard) the AM demodulator and QPS mixer is active. This condition allows a parallel operation of the AM sound signal and the NICAM-L stereo sound.

#### 5-2-9 L' Switch

With a control voltage at Pin 14 the VCO frequency can be switched for setting to the required L' value (L' standard). Also a fine adjustment of the L'-VCO center frequency is possible via a potentiometer. The L' switch is only active for positive modulated video IF-signals (standard switch in L mode).

#### 5-2-10 Internal Voltage Stabiliser

The internal bandgap reference ensures constant performance independent of supply voltage and temperature.

### 5-3 Video - VCT description

#### 5-3-1 Introduction

The VCT 38xxA includes complete video, display, and deflection processing. All processing is done digitally, the video front-end and video back-end are interfacing to the analogue world. Most functions can be controlled by software via I<sup>2</sup>C bus slave interface.

#### 5-3-2 Video Front-end

This block provides the analogue interfaces to all video inputs and mainly carries out analogue-to-digital conversion for the following digital video processing. Most of the functional blocks in the front-end are digitally controlled (clamping, AGC, and clock-DCO). The control loops are closed by the Fast Processor ('FP') embedded in the video decoder.

#### 5-3-3 Input Selector

Up to seven analogue inputs can be connected. Four inputs are for input of composite video or S-VHS luma signal. These inputs are clamped to the sync back porch and are amplified by a variable gain amplifier. Two chroma inputs can be used for connection of S-VHS carrier-chrominance signal. These inputs are internally biased and have a fixed gain amplifier.

#### 5-3-4 Clamping

The composite video input signals are AC-coupled to the IC. The clamping voltage is stored on the coupling capacitors and is generated by digitally controlled current sources. The clamping level is the back porch of the video signal. S-VHS chrominance is also AC-coupled. The input pin is internally biased to the center of the ADC input range. Each channel is sampled at 10.125 MHz with a resolution of 8 bit.

#### 5-3-5 Automatic Gain Control

A digitally working automatic gain control adjusts the magnitude of the selected baseband.

#### 5-3-6 Digitally Controlled Clock Oscillator

The clock generation is also a part of the analogue front-end. The crystal oscillator is controlled digitally by the control processor. The clock frequency can be adjusted within  $\pm 150$  ppm. This adjustment is done in factory for every TV set.

#### 5-3-7 Analogue Video Output

The input signal of the Luma ADC is available at the analogue video output pin (#11). The signal at this pin is buffered by a source follower. The output voltage is 2 V. The magnitude is adjusted with an AGC in 8 steps together with the main AGC.



### 5-3-8 Adaptive Comb Filter (VCT3834A only)

The adaptive comb filter is used for high-quality luminance/chrominance separation for PAL or NTSC signals. The comb filter improves the luminance resolution (bandwidth) and reduces interferences like cross-luminance and cross-color artefacts. The adaptive algorithm can eliminate most of the mentioned errors without introducing new artefacts or noise. The filter uses two line delays to process the information of three adjacent video lines. To have a fixed phase relationship of the colour subcarrier in the three channels, the system clock (20.25 MHz) is fractionally locked to the colour subcarrier. This allows the processing of all colour standards and substandards using a single crystal frequency. The CVBS signal in the three channels is filtered at the subcarrier frequency by a set of bandpass/notch filters. The output of the three channels is used by the adaptation logic to select the weighting that is used to reconstruct the luminance/chrominance signal from the 4 bandpass/notch filter signals. By using soft mixing of the 4 signals switching artefacts of the adaption algorithm are completely suppressed. The comb filter uses the middle line as reference, therefore, the comb filter delay is one line. If the comb filter is switched off, the delay lines are used to pass the luma/ chroma signals from the A/D converters to the luma/ chroma outputs. Thus, the comb filter delay is always one line.

### 5-3-9 Color Decoder

In this block, the standard luma/chroma separation and multi-standard colour demodulation is carried out. The colour demodulation uses an asynchronous clock, thus allowing a unified architecture for all colour standards. The colour killer uses the burst-phase/ burst-frequency measurement to identify a PAL/NTSC or SECAM colour signal. For PAL/NTSC, the colour is switched off (killed) as long as the colour subcarrier PLL is not locked. For SECAM, the killer is controlled by the toggle of the burst frequency. The burst amplitude measurement is used to switch-off the colour if the burst amplitude is below a programmable threshold. Thus, colour will be killed for very noisy signals. The colour amplitude killer has a programmable hysteresis. The burst-frequency measurement is also used for automatic standard recognition (together with the status of horizontal and vertical locking) thus allowing a completely independent search of the line and colour standard of the input signal. The following standards can be distinguished:  
PAL B,G,H,I; NTSC M; SECAM; NTSC 44; PAL M; PAL N; PAL 60. In AV mode or when Prg No 0 is selected all the standards above are enabled by the controlling software. In INSTALL menu the controlling software enables PAL B,G, H,I and SECAM detection. The colour standard for each program number is stored in EEPROM. Outside INSTALL menu and for programmes numbers 1 to 99, the auto colour detection is disabled, the colour standard is recall from EEPROM and forced.

### 5-3-10 Horizontal Scaler (VCT3834A only)

The 4:2:2 YC r C b signal from the colour decoder is processed by the horizontal scaler. The scaler block allows a linear or nonlinear horizontal scaling of the input video signal in the range of 0.25 to 4. Nonlinear scaling, also called "Panoramavision", provides a geometrical distortion of the input picture. It is used to fit a picture with 4:3 format on a 16:9 screen by stretching the picture geometry at the borders. Also, the inverse effect can be produced by the scaler. The scaler contains a programmable decimation filter, a 1-line FIFO memory, and a programmable interpolation filter.

### 5-3-11 Video Sync Processing

To extract the sync information from the video signal, a linear phase low-pass filter eliminates all noise and video contents above 1 MHz. The sync is separated by a slicer; the sync phase is measured. A variable window can be selected to improve the noise immunity of the slicer. The phase comparator measures the falling edge of sync, as well as the integrated sync pulse. The sync phase error is filtered by a phase-locked loop that is computed by the Fast Processor. All timing in the front-end is derived from a counter that is part of this PLL, and it thus counts synchronously to the video signal. A separate hardware block measures the signal back porch and also allows gathering the maximum/minimum of the video signal. This information is processed by the FP and used for gain control and clamping. For vertical sync separation, the sliced video signal is integrated. The FP uses the integrator value to derive vertical sync and field information. The information extracted by the video sync processing is multiplexed onto the hardware front sync signal (FSY) and is distributed to the rest of the video processing system.

The data for the vertical deflection, the sawtooth, and the East-West correction signal is calculated by the VCT 38xxA.

### 5-3-12 Display Processing

In the display processing the conversion from digital YC r C b to analogue RGB is carried out.

In the luminance processing path, contrast and brightness adjustments and a variety of features, such as black-level expansion, dynamic peaking and soft limiting, are provided. In the chrominance path, the C r C b signals are converted to 4:4:4 format and filtered by a colour transient improvement circuit. The YC r C b signals are converted by a programmable matrix to RGB colour space. The digital OSD insertion circuit allows the insertion of a 5-bit OSD signal.

The OSD signals and the display clock are synchronised to the horizontal flyback.

### 5-3-13 Chroma Transient Improvement

The intention of this block is to enhance the chroma resolution. A correction signal is calculated by differentiation of the colour difference signals. The differentiation can be selected according to the signal bandwidth, e.g. for PAL/NTSC/SECAM or digital component signals, respectively. The amplitude of the correction signal is adjustable. Small noise amplitudes in the correction signal are suppressed by an adjustable coring circuit. To eliminate 'wrong colours' which are caused by over and undershoots at the chroma transition, the sharpened chroma signals are limited to a proper value automatically.

### 5-3-14 Video Back-end

The digital RGB signals are converted to analogue RGBs using three video digital-to-analogue converters (DAC) with 10-bit resolution. An analogue brightness value is provided by three additional DACs. The adjustment range is 40 % of the full RGB range. Controlling the white-drive/analogue brightness and also the external contrast and brightness adjustments is done via the Fast Processor, located in the front-end. Control of the cutoff DACs is done via I 2 C bus registers. Finally cutoff and blanking values are added to the RGB signals. Cutoff (dark current) is provided by three 9-bit DACs. The adjustment range is 60 % of full scale RGB range. The analogue RGB-outputs are current outputs with current-sink characteristics. The maximum current drawn by the output stage is obtained with peak white RGB. An external half contrast signal can be used to reduce the output current of the RGB outputs to 50% . Cutoff and white-drive current measurement are carried out during the vertical blanking interval. They always use the small bandwidth setting.

### 5-3-15 CRT Measurement and Control

The display processor is equipped with an 8-bit ADC for all measuring purposes. The ADC is connected to the SENSE input pin. Cutoff and white-drive current measurement are carried out during the vertical blanking interval.

### 5-3-16 Average Beam Current Limiter

The average beam current limiter (BCL) uses the SENSE input for the beam current measurement. The BCL uses a different filter to average the beam current during the active picture. The filter bandwidth is approx. 2 kHz. The beam current limiter has an automatic offset adjustment that is active two lines before the first cutoff measurement line. The beam current limiter function is located in the front-end. The data exchange between the front-end and the back-end is done via a single-wire serial interface. The beam current limiter allows the setting of a threshold current. If the beam current is above the threshold, the excess current is low-pass filtered and used to attenuate the RGB outputs by adjusting the white-drive multipliers for the internal (digital) RGB signals, and the analogue contrast multipliers for the analogue RGB inputs, respectively. The lower limit of the attenuator is programmable, thus a minimum contrast can always be set. During the tube measurement, the ABL attenuation is switched off. After the white-drive measurement line it takes 3 lines to switch back to BCL limited drives and brightness.

### 5-3-17 Analogue RGB Insertion

The VCT 38xxA allows insertion of external analogue RGB signals. The RGB signal is key-clamped and inserted into the main RGB by the Fast-Blank switch. The external RGB input can be overlaid or underlaid to the digital picture. The external RGB signals can be adjusted independently as regards DC level (brightness) and magnitude (contrast). All signals for analogue RGB insertion (RIN, GIN, BIN, FBLIN) must be synchronised to the horizontal flyback, otherwise a horizontal jitter will be visible. The VCT 38xxA has no means for timing correction of the analogue RGB input signals. RGB signals are not digitalised and therefore cannot be processed by the picture scaler.

### 5-3-18 Fast-Blank Monitor

The presence of external analog RGB sources can be detected by means of a Fast-Blank monitor. With a special monitor logic it is possible to detect if there is an external RGB source active and if it is a full screen insertion or only a box. The monitor logic is connected directly to the FBLIN pin. The controlling software uses this information to disable all picture format using display scaler.

### 5-3-19 Vertical and East/West Deflection

The calculations of the vertical and East/West deflection waveforms is done by the internal Fast Processor (FP). The algorithm uses a chain of accumulators to generate the required polynomial waveforms. To produce the deflection waveforms, the accumulators are initialised at the beginning of each field. The initialisation values must be computed by the TV control processor and are written to the front-end once.

### 5-3-20 EHT Compensation

The vertical waveform can be scaled according to the average beam current. This is used to compensate the effects of electric high-tension changes due to beam current variations. EHT compensation for East/West deflection is done with an offset corresponding to the average beam current.

### 5-3-21 Reset Function

Reset of all VDP functions is performed by the RESQ pin. When this pin becomes active, all internal registers and counters are lost.

### 5-3-22 Standby and Power-On

The VDP does not have a standby mode. To disable all the analogue and digital video functions, it is necessary to switch off the supplies for analogue front-end (VSUP AF ), analogue back-end (VSUP AB ) and digital circuitry (VSUP D ).

## 5-4- Microcontroller

### 5-4-1 Introduction

The TV controller basically consists of the CPU, RAM, ROM, and a number of peripheral modules.

For instance:

- a memory banking module is included to allow access to more than 64 kB memory.
- a bootloader software is included to allow in-system-downloading of external code to Flash memory via the I<sup>2</sup>C interface.

The TV controller runs the complete software necessary to control a TV set. The software includes control of the audio, video, OSD, and text processors on chip, as well, as control of external devices like tuner or stereo decoder.

Communication between the TV controller and external devices is done either via I<sup>2</sup>C bus interface or via programmable port pins. The TV Controller is clocked with  $f_{OSC} = f_{XTAL} / 2$ .

### 5-4-2 CPU

The CPU is fully compatible to WDC's W65C02 micro-processor. The processor has 8-bit registers/accumulator, an 8-bit data bus, and a 16-bit address bus.

### 5-4-3 $\mu$ - Controller I/O pin configuration and function

There exist different kinds of ports. The universal ports serve as digital I/O and have additional special input and output functions. A subset of the universal ports serves as input for the analogue-to-digital converter.

$\mu$  - Controller I/O pin configuration and function table

| pin | name     | configuration  |                | description   |
|-----|----------|----------------|----------------|---|
|     |          | Stand by       | TV ON          |   |
| 1   | Power    | Push Pull Low  | Push Pull High | Switch OFF / ON SMPS  |
| 2   | AGC      | High impedance | High impedance | Tuner AGC level input –<br>For factory use only               |
| 5   | Mod SW   | High impedance | Push Pull      | High = Negative modulation, Low = Positive modulation (L/L'). |
| 6   | SECAM L' | High impedance | Push Pull      | Low = L, High =L'   |
| 7   | AFC      | High impedance | High impedance | ADC input   |
| 8   | IR       | High impedance | High impedance | Interrupt input   |
| 9   | SC1 SW   | High impedance | High impedance | SCART 1 slow switching –<br>ADC input                         |
| 10  | SC2 SW   | High impedance | High impedance | SCART 2 slow switching –<br>ADC input                         |
| 61  | Mute     | Push Pull      | Push Pull      | High = Mute active  |
| 62  | LED      | Open Drain     | Open Drain     |   |
| 63  | KB       | High impedance | High impedance | Keyboard input – ADC input                                    |
| 64  | OCP      | High impedance | High impedance | Over Current Protection –<br>Switch the set to Std by if < 2. |

To reduce power consumption in stand by mode all ports not used are configured in high impedance mode.

### 5-4-4 Tuning

The AFC information is supplied by the demodulator IC, and becomes available on VCT pin 7 for controlling software. The controlling software uses this information for tuner frequency tracking ( automatic following ). The AFC window is typically between 50 KHz and 100 KHz.

The minimum frequency step of the tuner is 50 KHz.

This AFC function is disabled when a program is tuned using the direct frequency entry or after fine tuning adjustment. Therefore it is recommended to tune channel with the TV search function ( manual or ATSS ) or using the direct channel entry to enable the Automatic Frequency Control.

### 5-4-5 Automatic Format switching and WSS

When AUTO mode is selected by the user, the television will automatically select a mode for the user. The format information is supplied by SCART pin 8 level when in AV mode or by WSS data. The signal contains codes as defined in the WSS European Telecommunication Standard, ETS 300 294. Briefly, the signal is received at the beginning of line

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23, in each frame. This is bi-phase encoded using a clock frequency of 5 MHz. In total, 14 data bits are available, in 4 groups. Group 1 contains the codes for the received format.

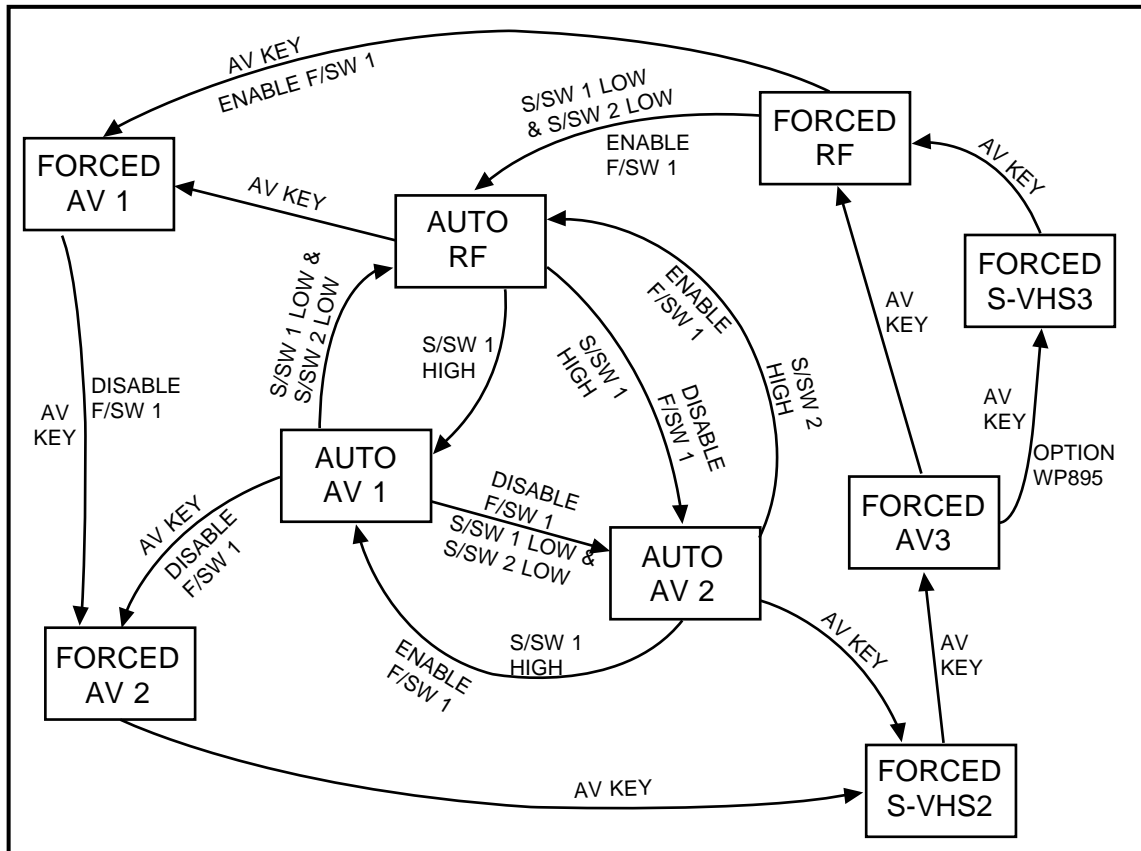
The mode chosen is defined by the following table. In effect the default mode is full screen.

The table below gives a summary of the FORMAT modes available (for WP895 and WP895F), and their given properties.

| Format Name(OSD) | Zoom factor – TV with 16:9 CRT |            | Description   | Application   |
|------------------|--------------------------------|------------|---|---|
|                  | Vertical                       | Horizontal |   |   |
| 4:3              | 100%                           | 75%        | Picture is centred with black bars at the left and right hand side of the display   | Standard 4/3 picture with 576 active lines  |
| 14:9             | 114%                           | 87%        | Picture is centred with black bars at the left and right hand side of the display   | 14:9 picture – letter box format with 504 active lines  |
| ZOOM 14:9        | 114%                           | 100%       | Picture is displayed filling the full width of the screen by incorporating a small horizontal geometrical error (typically 8% linear) | 14:9 picture – letter box format with 504 active lines  |
| ZOOM 16:9        | 133%                           | 100%       | Picture is displayed filling the full screen (width and height)   | 16:9 picture – letter box format with 430 active lines  |
| PANORAMA         | 100%                           | 100%       | Picture is displayed filling the full screen (width and height)   | Used to fit a picture with 4:3 format on a 16:9 screen by stretching the picture geometry at the borders. |

5-4-6 EXTERNAL source control logic

The following schematic, illustrates the logic of control for the two SCART connectors.



The terms used in the schematic are described below ;

1. AUTO represents a situation where the television has self-selected its picture source. This could be when the SCART SLOW SWITCHING pin has gone to a high state, and the AV 1 input is selected without the intervention of the user.
2. FORCED represents the change of source which has been commanded by the user (using the EXTERNAL button). The user always has priority, and can override the AUTO change of source by the television.
3. AV KEY represents the EXTERNAL button of the remote control, or on the television.
4. S/SW 1, or S/SW 2 represent the SLOW SWITCHING inputs of the first SCART (AV 1) or second SCART (AV 2), these each being pin number 8.
5. F/SW 1 represents the FAST SWITCHING input of the first SCART (AV 1), on pin number 16. The second SCART, AV 2, input does not possess a FAST SWITCHING input.

The HIGH state of a slow switching input represents the request from the external source to be selected by the television. Whether this is accepted or not depends on the position in the logic diagram. The general rule is that the user always has priority, so the use of the AV KEY will always result in a defined logic path being followed. Under certain circumstances, defined in the diagram, the change of state of a slow switching input will result in the automatic change of source by the television. This change, such as the change from RF broadcast to the AV 1 input,

can always be overridden by the user after the event.

Each line on the diagram, with its associated text, represents the exact conditions under which the change of state will occur. Sometimes this will be accompanied by another action which will be automatically performed by the television, being to either ENABLE or DISABLE F/SW 1.

### 5-4-7 Over Current Protection

In case of overload, the SMPS secondary voltages will drop. The voltage on pin 64 of microcontroller drops below a reference voltage (2.26V). The controlling software which continuously monitors this voltage will switch the set to stand by mode. To power on the set again the user must switch it off using the main power switch. Appropriate hysteresis guaranrees a reliable operation.

### 5-5 Teletext Display

National character option bits C12, C13, C14 are transmitted in the page header of a given teletext page. The national option bits are intended to change (or exchange) 13 characters within the G0 character set, according to the needs of each national language. However, for Cyrillic and Greek languages, a major character set change (a change of character mapping) needs to effected for correct display.

These codes represent, for a given broadcaster, the intended language that the teletext page should be displayed in. As there are only 3 bits, there are only 8 codes available to cover all the possible language combinations. This means that for a received code there are several possibilities meanings, and therefore several possibilities for display.

This is not as bad as it first seems, as we use the user-selected OSD language to identify the intention of the broadcaster. For example, a user wishing to see Russian teletext should select Russian OSD language, otherwise he would not have correct teletext display on the TV.

The table below allows the reader to understand the relationship between selected OSD language (which is under user control), the teletext language display (selected by national option bits in transmission page header) and the language mapping (either Latin or Greek/Cyrillic)

An example: For Greek teletext display, (if national option code 1 1 1 is received from the broadcaster), the user should select the Greek OSD language. Even if English, French, German, Italian, Spanish, Dutch, Danish, Finnish, Norwegian or Swedish OSD languages are selected, the teletext will be correctly displayed.

However, if Polish, Hungarian, Czech, Slovakian, Rumanian or Russian OSD are selected, Latin font mapping is selected. The consequence will be incorrect teletext display, with NO GREEK CHARACTERS DISPLAYED. Rumanian national font options will be selected.



| OSD Language  | C<br>12 | C<br>13 | C<br>14 | Teletext Language    | ESC<br>Teletext Language | Mapping        |
|---|---------|---------|---------|----------------------|--------------------------|----------------|
| English, French,<br>German, Italian,<br>Spanish, Dutch,<br>Danish, Finnish,<br>Norwegian,<br>Swedish, Greek | 0       | 0       | 0       | English              | English                  | Latin          |
|   | 0       | 0       | 1       | German               | German                   | Latin          |
|   | 0       | 1       | 0       | Swedish/Finnish      | Swedish/Finnish          | Latin          |
|   | 0       | 1       | 1       | Italian              | Italian                  | Latin          |
|   | 1       | 0       | 0       | French               | French                   | Latin          |
|   | 1       | 0       | 1       | Spanish              | Spanish                  | Latin          |
|   | 1       | 1       | 0       | Turkish              | Turkish                  | Latin          |
|   | 1       | 1       | 1       | English              | Greek                    | Greek/Cyrillic |
| Polish,<br>Hungarian,<br>Czech,<br>Slovakian,<br>Rumanial   | 0       | 0       | 0       | Polish               | Polish                   | Latin          |
|   | 0       | 0       | 1       | German               | German                   | Latin          |
|   | 0       | 1       | 0       | Hungarian            | Hungarian                | Latin          |
|   | 0       | 1       | 1       | Italian              | Italian                  | Latin          |
|   | 1       | 0       | 0       | French               | French                   | Latin          |
|   | 1       | 0       | 1       | Serb/Croat/Slovenian | Serb/Croat/Slovenian     | Latin          |
|   | 1       | 1       | 0       | Czech/Slovak         | Czech/Slovak             | Latin          |
|   | 1       | 1       | 1       | Rumanian             | Rumanian                 | LatinRussian   |
| Russian<br>Bulgarian  | 0       | 0       | 0       | English              | Serbian/Montenegrin      | Greek/Cyrillic |
|   | 0       | 0       | 1       | German               | German                   | Latin          |
|   | 0       | 1       | 0       | Estonian             | Estonian                 | Latin          |
|   | 0       | 1       | 1       | Lettish/Lithuanian   | Lettish/Lithuanian       | Latin          |
|   | 1       | 0       | 0       | English              | Russian/Bulgarian        | Greek/Cyrillic |
|   | 1       | 0       | 1       | English              | Ukrainian                | Greek/Cyrillic |
|   | 1       | 1       | 0       | Czech/Slovak         | Czech/Slovak             | Latin          |
|   | 1       | 1       | 1       | Rumanian             | Rumanian                 | Latin          |

## 5-6 Sound processing

### 5-6-1 Analogue sound IF - input section

The input pins ANA\_IN1+ and ANA\_IN- offer the possibility to connect sound IF sources to the MSP 341xD. The analogue-to-digital conversion of the preselected sound IF signal is done by an A/D converter, whose output is used to control an analogue automatic gain circuit (AGC), providing an optimal level for a wide range of input levels.

### 5-6-2 Quadrature Mixers

The digital input coming from the integrated A/D converter may contain audio information at a frequency range of theoretically 0 to 9 MHz corresponding to the selected standards. By means of two programmable quadrature mixers, two different audio sources ; for example, NICAM and FM-mono, may be shifted into baseband position.

### 5-6-3 Phase and AM discrimination

The filtered sound IF signals are demodulated by means of the phase and amplitude discriminator block. On the output, the phase and amplitude is available for further processing.

AM signals are derived from the amplitude information, whereas the phase information serves for FM and NICAM demodulation.

### 5-6-4 NICAM decoder

In case of NICAM - mode, the phase samples are decoded according the DQPSK - coding scheme. The output of this block contains the original NICAM bitstream.

### 5-6-5 DSP section

All audio baseband functions are performed by digital signal processing (DSP). The DSP section controls the source and output selection, and the signals processing.

### 5-6-6 Sound Mode switching

In case of NICAM transmission, the controlling software reads the bit error rate and the operation mode from the NICAM Decoder. When the set is in "Auto detection" mode ( default mode after ATSS ) the controlling software sets automatically the sound mode ( NICAM mono, NICAM Dual 1 or NICAM Dual 2 ) depending on the transmitted mode.

In the case of 2 Carrier FM transmission, the controlling software read the transmission mode and the signal quality level from the Stereo Detection Register. When the set is in "Auto detection" mode the controlling software automatically sets the sound mode ( mono, Stereo, Dual 1, Dual 2 ) depending on the transmitted mode.

In "Auto detection" mode the controlling software evaluates the signal quality and automatically switches to the analogue sound carrier 1, if the transmission quality is too poor. To avoid unwanted automatic switching the threshold levels mono to stereo and stereo to mono are different.

In "forced mono " mode ( Red OSD in status Display Window), the controlling software configures the MSP341xD to demodulate the analogue (FM or AM) sound carrier 1, no matter the signal quality. The sound mode " forced " or " Autodetect" is stored for each programme.

### 5-7 Sound amplification

The TDA8946J is a stereo BTL audio amplifier capable of delivering 2 x 15 W output power to an 8 W load at THD = 10%, using a 18 V power supply and an external heatsink. The voltage gain is fixed at 32dB.

With the three-level MODE input the device can be switched from 'standby' to 'mute' and to 'operating' mode. The TDA 8946J outputs are protected by an internal thermal shutdown protection mechanism and short-circuit protection.

#### 5-7-1 Power amplifier

The power amplifier is a Bridge Tied Load (BTL) amplifier with an all-NPN output stage, capable of delivering a peak output current of 1.5 A.

The BTL principle offers the following advantages :

- Lower peak value of the supply current.
- The ripple frequency on the supply voltage is twice the signal frequency.
- No DC-blocking capacitor
- Good low frequency performance

### 5-7-2 Mode selection

The TDA894xJ has several functional modes, which can be selected by applying the proper DC voltage to pin MODE.

Mute : In this mode the amplifier is DC biased but not operational (no audio output). This allows the input coupling capacitors to be charged to avoid pop-noise. The device is in mute mode when  $2.5\text{ V} < V_{\text{MODE}} < (V_{\text{CC}} - 1.5\text{ V})$ .

Operating : In this mode the amplifier is operating normally. The operating mode is activated at  $V_{\text{MODE}} < 0.5\text{ V}$ .

### 5-8 Vertical deflection

The vertical driver circuit is a bridge configuration. The deflection coil is connected between the output amplifiers, which are driven in phase opposition. The differential input circuit is voltage driven. The input circuit is especially intended for direct connection to driver circuits which deliver symmetrical current signals, but is also suitable for asymmetrical currents. The output current of these devices is converted to voltages at the input pins via resistors R350 and R351. The differential input voltage is compared with the output current through the deflection coils measured as voltage across R398, which provides internal feedback information. The voltage across R398 is proportional to the output current.

#### 5-8-1 Flyback voltage

The flyback voltage is determined by an additional supply voltage  $V_{\text{fb}}$ . The principle of operation with two supply voltages (class G) makes it possible to fix the supply voltage  $V_{\text{p}}$  optimum for the scan voltage and the second supply voltage  $V_{\text{fb}}$  optimum for the flyback voltage. Using this method, very high efficiency is achieved. The supply voltage  $V_{\text{fb}}$  is almost totally available as flyback voltage across the coil, this being possible due to the absence of a coupling capacitor.

#### 5-8-2 Protection

The output circuit has protection circuits for :

- Too high die temperature
- overvoltage of output stage A

#### 5-8-3 Guard circuit

The guard signal is not used.

#### 5-8-4 Damping resistor

For HF loop stability a damping resistor (R331) is connected across the deflection coil.

#### 5-8-5 EAST-WEST Amplifier (TDA8358J)

The East-West amplifier is current driven. It can only sink currents of the diode modulator circuit. A feedback resistor R397 is connected between the input and output of this inverting amplifier in order to convert the East-West correction input into an output voltage.

5-9 Power supply (STR F6654)

**5-9-1 STR-F6654 general description**

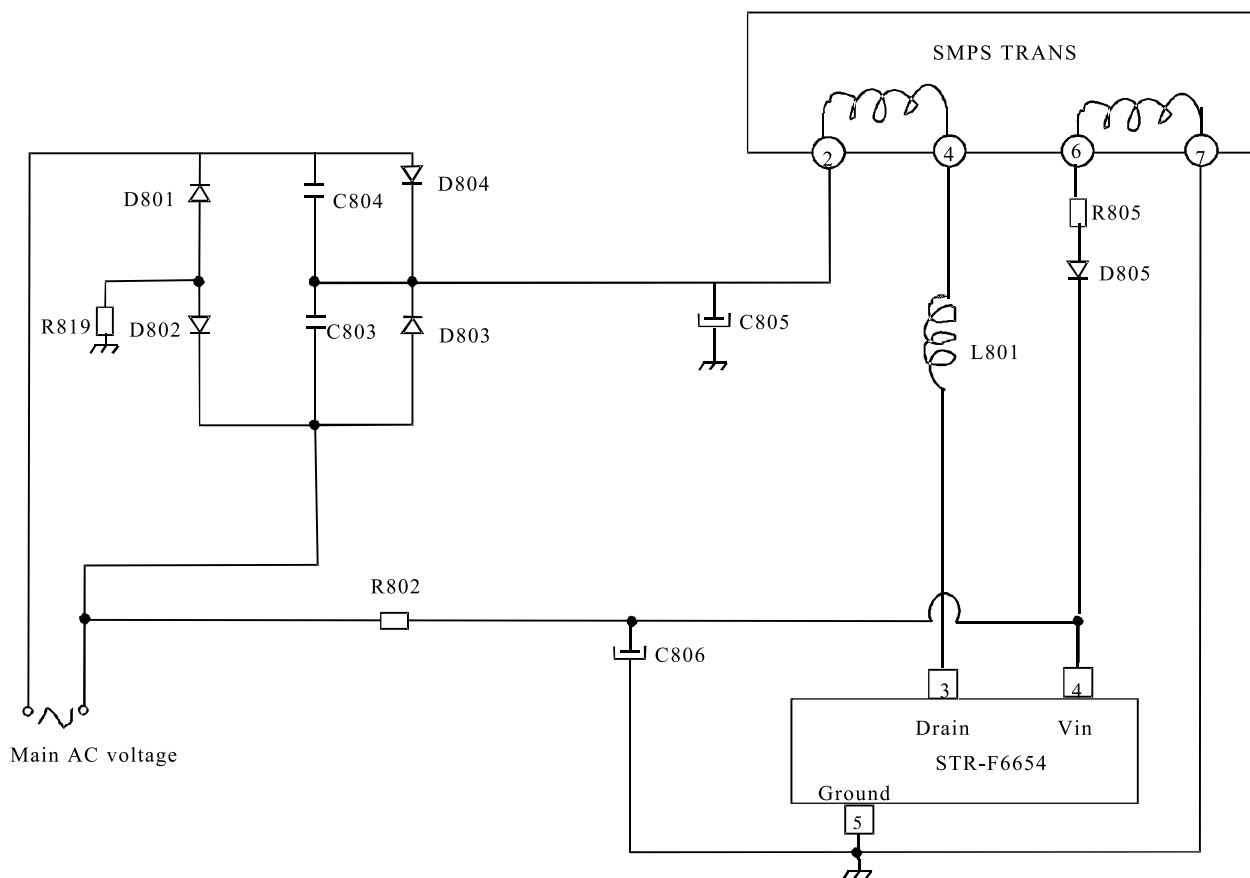
The STR-F6654 is an hybrid IC with a build-in MOSFET and control IC, designed for flyback converter type switch mode power supply applications.

**5-9-2 Power supply primary part operations**

An oscillator generates pulses signals which turn on and off a MOSFET transistor.

5-9-2-1 Start-up circuit :  $V_{IN}$

The start-up circuit is used to start and stop the operation of the control IC, by detecting a voltage appearing at  $V_{IN}$  pin (pin 4).



**Fig : Power supply start-up circuit**

When the power switch is pushed on,  $V_{IN}$  increases slowly. During this time, C806 is charged through R802.

As soon as  $V_{IN}$  reaches 16V, the STR-F6654 control circuit starts operating. Then,  $V_{IN}$  is obtained by smoothing the winding voltage which appears between pin6 and pin7 of the SMPS transformer.

As this winding voltage does not increase to the set voltage immediately after the control circuit starts operating,  $V_{IN}$  starts dropping. However, as this winding voltage reaches the set value before  $V_{IN}$  voltage drops to the shutdown voltage (at 11V), the control circuit continues operating (see below  $V_{IN}$  voltage at start-up). R805 resistor prevents that  $V_{IN}$  pin voltage varies according to the secondary side output current.

$V_{IN}$  must be set higher than the shutdown voltage ( $V_{IN}(\text{off}) = 11V_{\text{max}}$ ) and lower than the O.V.P. (overvoltage protection) operating voltage ( $V_{\text{OVP}} = 20.5V_{\text{min}}$ )

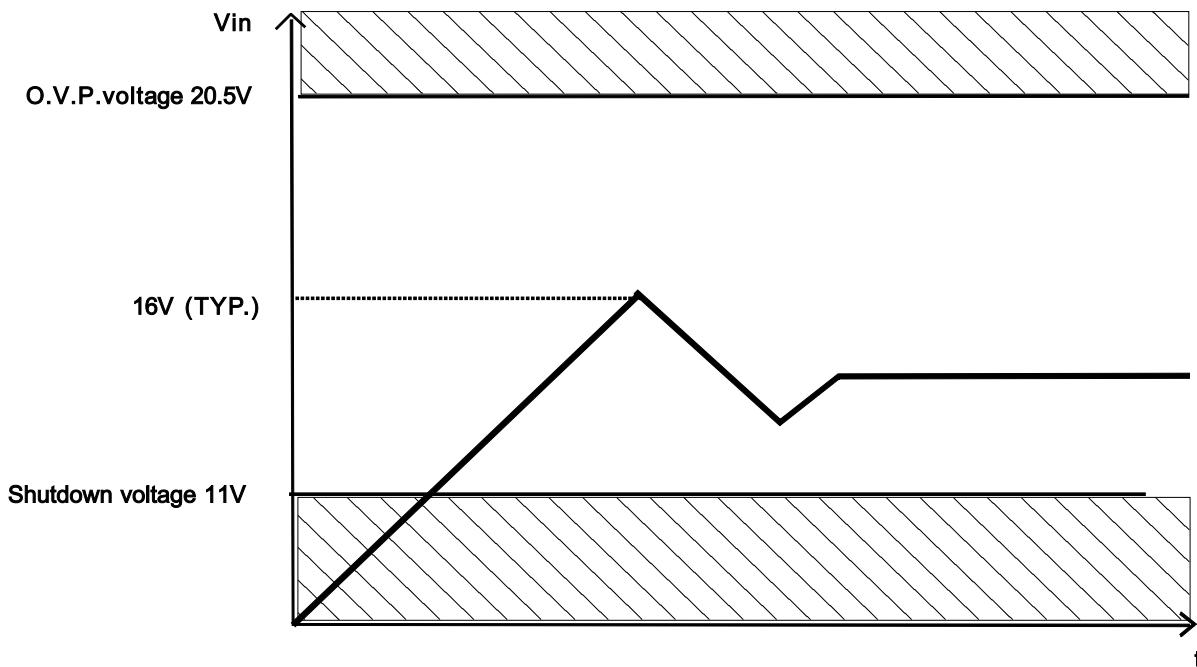


Fig : Waveform of  $V_{in}$  pin voltage at start-up

5-9-2-2 STR-F6654 oscillating operation

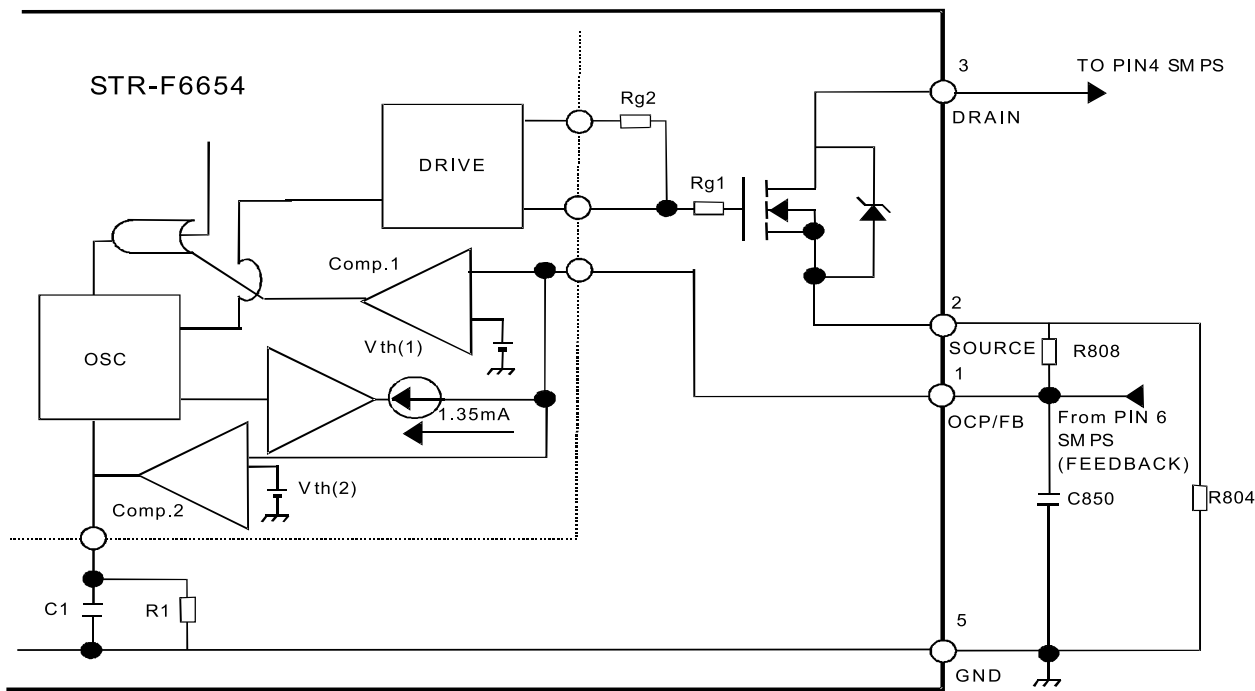


Fig : Oscillating operation

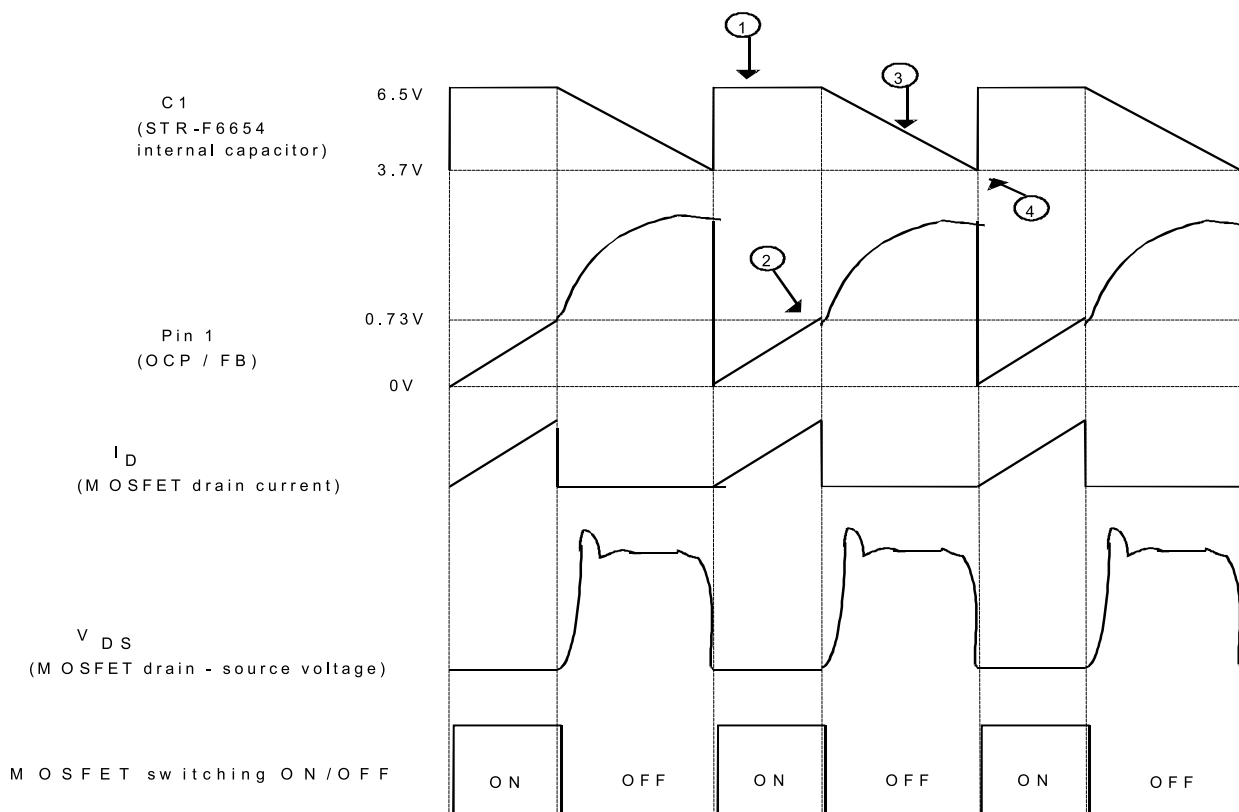


Fig : Waveforms during oscillating operation

- ① When the MOSFET is ON, the STR-F6654 internal capacitor C1 is charged at the constant voltage 6.5V. At the same time, the voltage at pin 1 (OCP / FB) increases with the same waveform as the MOSFET drain current.
- ② When the pin 1 voltage reaches the threshold voltage  $V_{TH1} = 0.73V$ , the STR-F6654 internal comparator 1 starts operating. The STR-F6654 internal oscillator is inverted and the MOSFET turns OFF.
- ③ When the MOSFET turns OFF, charging of STR-F6654 internal capacitor C1 is released and C1 starts discharging by the STR-F6654 internal resistance R1. So, C1 voltage starts falling in accordance with the gradient regulated by the constant discharging time of C1 and R1. So, this means that the fixed time determined by C1 and R1 is the OFF-time of the MOSFET.
- ④ When C1 voltage falls to around 3.7V, the STR-F6654 internal oscillator is reversed again and the MOSFET turns ON. C1 is quickly charged to around 6.5V

The MOSFET continues to oscillate by repeating the above procedure.

#### 5-9-2-3 STR-F6654 protection circuits

##### **overcurrent protection function (OCP)**

Overcurrent protection is performed pulse by pulse detecting at STR-F6654 pin 1 (OCP) the peak of the MOSFET drain current in every pulse.

##### **• latch circuit**

This circuit sustains an output low from the STR-F6654 internal oscillator and stops operation of the power supply when overvoltage protection (OVP) and thermal shutdown (TSD) circuit are under operation

##### **thermal shutdown circuit (TSD)**

This circuit triggers the latch circuit when the frame temperature of STR-F6654 IC exceeds 140°C

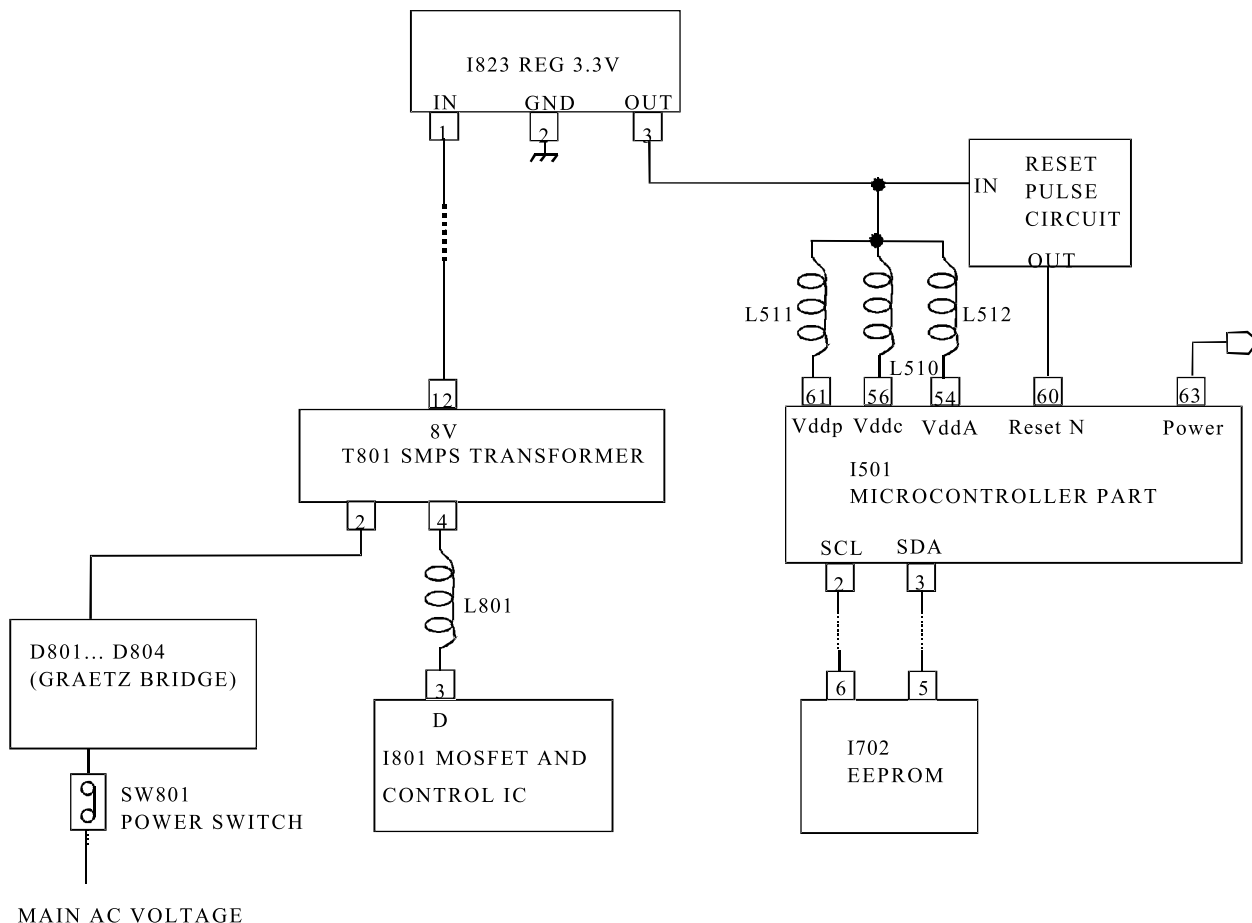
##### **overvoltage protection circuit (OVP)**

This circuit triggers the latch circuit when the  $V_{in}$  voltage exceeds 22V (typ.)

5-10 TV start-up, TV normal run and stand by mode operations

**5-10-1 TV start-up operations**

\* Schematic diagram for start-up operations



Start-up operations

\* TV start-up and microcontroller initialisation

- When SW801 power switch is pushed, main AC voltage is applied to T801 transformer (after rectification by D801... D804 diodes). Then, T801 SMPS transformer starts operating and supplies DC voltage to I823 (5V regulator).
- This regulator provides 5V / 3.3V DC voltage to I501 microcontroller power supply pins (pin 3 / pin 54) and to the reset pulse circuit which provides reset pulse to I501 microcontroller reset pin (pin 58).
- Then, the microcontroller starts its initialisation. Its power pin (pin 1) is set to high which allows delivery of power supply voltages (123V, 8V, 5V...). At this step, all ICs start working but no picture appears on screen: I501 IC doesn't provide horizontal drive voltage.
- Then, the microcontroller consults I702 EEPROM via I2C bus to know the last TV set mode (normal run mode or stand-by mode ) before switching off.



- . If the TV set was on normal run mode before switching off, the microcontroller delivers horizontal drive voltage at pin 24 and picture appears on screen.
- . If the TV set was on stand-by mode before switching off, the microcontroller switches TV set to stand-by mode, decreasing power pin voltage (pin 1).

**5-10-2 TV normal run and stand-by mode operations**

Depending on remote control commands, I501 microcontroller part pin 1 (power) is set to :

- high for normal run mode
- low for stand-by mode

a) TV on normal run mode

\* I501 microcontroller part pin 1 (power) effect

I501 microcontroller part pin 1 (power) is connected to the following circuit :

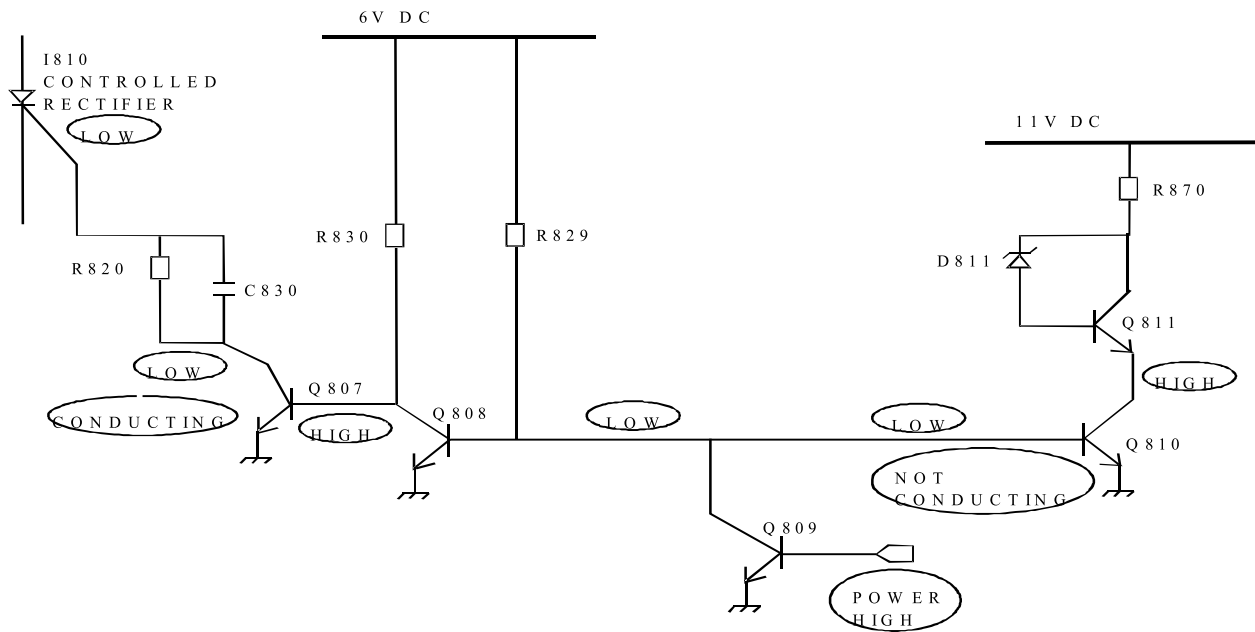


Fig : I501 microcontroller part pin 63 (POWER) effect

On normal run mode, I501 microcontroller pin 1 (power) is set to high

So, I810 controlled rectifier is not conducting

- Q809 is conducting. So, Q808 is not conducting and Q807 is conducting
- So, Q807 collector is connected to the ground and I810 controlled rectifier gate pin is set to low (no conducting)

So, current from 14V DC voltage (from T801 SMPS transformer pin 13) does not flow through Q811 and Q810 transistors but flows through I806 IC error amplifier

- Q809 is conducting. So, Q810 is not conducting and no current flows from Q810 collector to the ground
- Therefore, the power circuit diagram is the following one :

\* power supply circuit diagram during TV set normal run

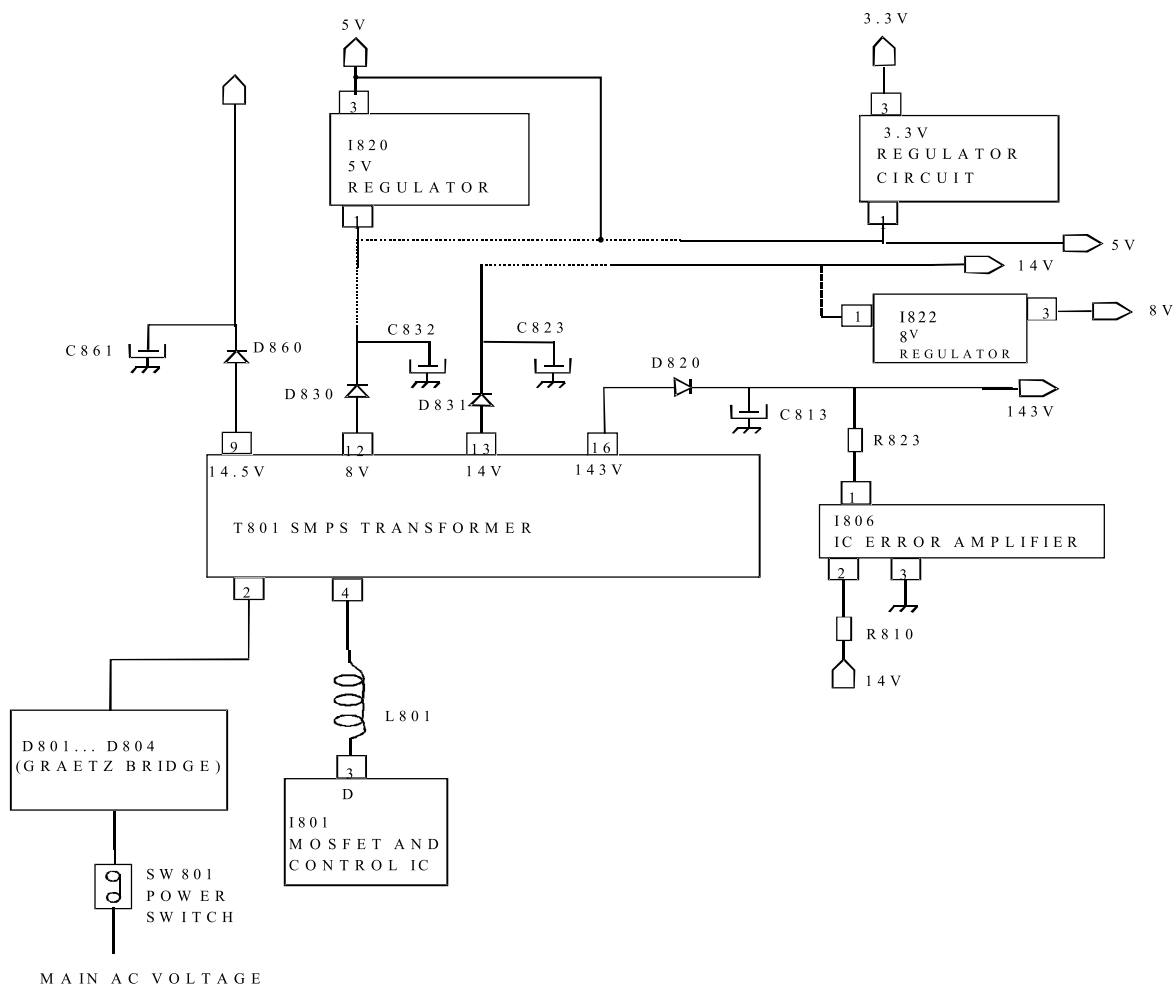


Fig : Power supply operation during TV set normal run

\* power supply functioning during TV set normal run mode

- I801 transmits controlled pulses to T801 which generates DC voltages after rectifications by secondary part diodes and electro capacitors (by example by D820 and C813 on 143V supply voltage line).

- 8V, 5V, 3.3V supply voltage lines have stabilized voltages obtained by I820, I822, I823 voltage regulators.

- On 143V supply voltage line, R823 resistor has been chosen to reach exact DC voltage required on this line.

- 143V supply voltage line includes an IC error amplifier (I806) which corrects unexpected DC voltage variations on this line.

\* power supply IC delivery during TV set normal run

| power supply line | IC power supply delivery   | Remarks   |
|-------------------|--|---|
| 143V              | FBT  | FBT supplies 43V to I301 vertical IC<br>FBT supplies 43V to T401 H- drive for CP785<br>FBT supplies 12V to I301 vertical IC<br>FBT supplies 33V to the tuner<br>FBT supplies 188V to I901 video amplifier pin 6 |
| 14.5V             | I602 sound amplifier pins 3-16   |   |
| 14V               | T401 H- drive  |   |
| 8V                | I501 Main IC pins 14-39<br>I601 Sound Demod pins 38-39-40  |   |
| 5V                | I703 IR receiver pin 1<br>I501 Main IC pins 3-15-45<br>I601 Sound Demod pins 7-18-57<br>I702 EEPROM pin 8<br>tuner |   |
| 3.3V              | I501 Main IC pins 25-54  |   |

b) TV set on stand-by mode

\* TV set circuit diagram on stand-by mode

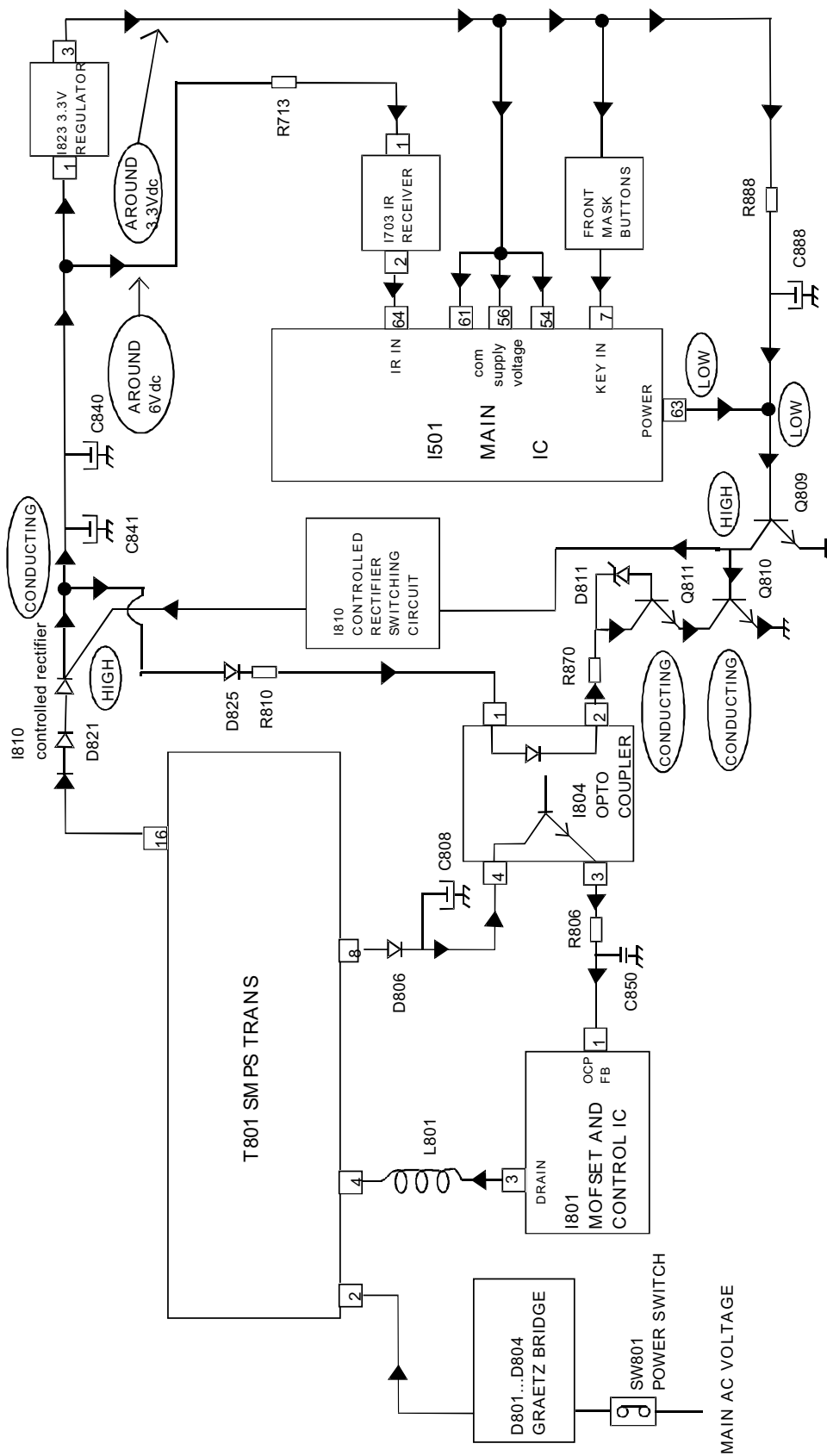


Fig : Power supply operation in stand - by mode

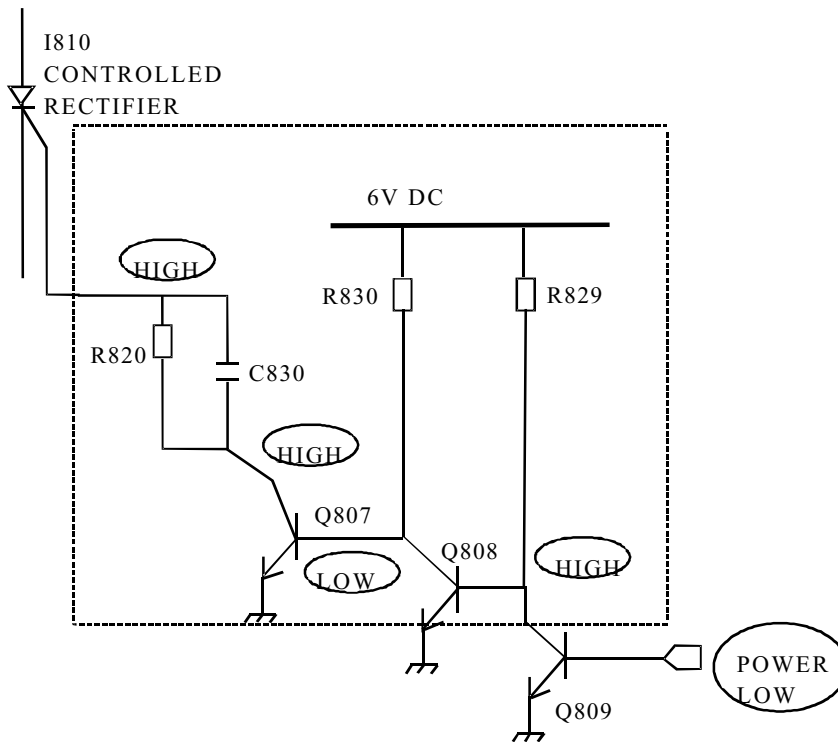


Fig : I810 controlled rectifier switching circuit

\* TV set stand-by mode operations

- On stand-by mode, I501 microcontroller pin 1 (power) is set to low.
- So, Q809 collector is set to high.
- Then, I810 controlled rectifier gate pin is set to high and I810 is conducting.
- So, current flows from pin 16 SMPS transformer to the ground via I804 optocoupler and Q810 and Q811 transistors (which are conducting).
- In these conditions, I801 delivers pulses on light mode and T801 produces voltages with reduced power.
- As I810 is conducting, current flows also from pin 16 SMPS transformer to I823 (5V / 3.3V regulator) for I501  $\mu$  com, IR receiver and front mask buttons supply voltage (then, remote control or front mask buttons can be activated to leave stand-by mode).

# Service manual SC-150

## 6-1. Service Parts List

| z_loc | z_parts_code | parts_name          | parts_descr               | z_loc | z_parts_code | parts_name         | parts_descr             |
|-------|--------------|---------------------|---------------------------|-------|--------------|--------------------|-------------------------|
| ZZ100 | 48B4846G22   | TRANSMITTER REMOCON | R-46G22 (AAA)             | C890  | CCYE3D103P   | C CERA             | 2KV E 0.01MF P          |
| ZZ110 | PEPKCPD037   | PACKING AS          | DSC-3220E                 | D403  | DDGP30L---   | DIODE              | DGP30L                  |
| M641  | 6520010100   | STAPLE PIN          | AUTO W65                  | D404  | DRGP30J---   | DIODE              | RGP30J                  |
| M681  | 4856812400   | BAND PP AUTO        | T1.1XW17mmXL770M          | D820  | DRGP30J---   | DIODE              | RGP30J                  |
| M801  | 4958002200   | BOX CARTON          | DW-4                      | D860  | DRGP30J---   | DIODE              | RGP30J                  |
| M811  | 4958102500   | PAD                 | EPS                       | F801  | 5FSCB4022R   | FUSE CERA          | SEMKO F4AH 4A 250V MF51 |
| M821  | 4958200701   | BAG P.E             | FOAM T0.5X1880X1380       | I101  | 1TDA4470M-   | IC IF              | TDA4470-M               |
| ZZ120 | PEBCSHD037   | COVER BACK AS       | DSC-3220E                 | I301  | 1TDA8358J-   | IC VERTICAL        | TDA8358J                |
| M211  | 4952102201   | COVER BACK          | HIPS                      | I301A | 4857028227   | HEAT SINK          | AL EX BK                |
| M211E | 4857817610   | CLOTH BLACK         | FELT 300X20X0.7           | I301B | 7174301011   | SCREW TAPPITTE     | TT2 RND 3X10 MFZN       |
| ZZ131 | 58GD000004   | COIL DEGAUSSING     | DC-3200(D)                | I501  | 1DW3834AE2   | IC MICOM           | DW3834-C4-AE2           |
| ZZ132 | 49519A0110   | CRT GROUND NET      | DSC-3210E                 | I601  | 1MSP3410V3   | IC SOUND PROCESSOR | MSP3410G-PP-B8-V3       |
| ZZ140 | PECACAD037   | CABINET AS          | DSC-3220E                 | I602  | 1TDA8946J-   | IC AUDIO AMP       | TDA8946J                |
| M201A | 4956000100   | SCREW CRT FIX       | SWRM10A L=35              | I602A | 4857028227   | HEAT SINK          | AL EX BK                |
| M201B | 4856215401   | WASHER RUBBER       | CR T1.0                   | I602B | 7174301011   | SCREW TAPPITTE     | TT2 RND 3X10 MFZN       |
| M201C | 7178301212   | SCREW TAPPITTE      | TT2 WAS 3X12 MFZN BK      | I603  | 1KA4558---   | IC AMP             | KA4558                  |
| M201D | 7178301212   | SCREW TAPPITTE      | TT2 WAS 3X12 MFZN BK      | I702  | 1CAT24C16P   | IC MEMORY          | CAT24WC16P              |
| M211A | 7172401612   | SCREW TAPPITTE      | TT2 TRS 4X16 MFZN BK      | I801  | 1STRF6654-   | IC SMPS            | STR-F6654               |
| M211B | 7172401612   | SCREW TAPPITTE      | TT2 TRS 4X16 MFZN BK      | I801A | 4857027910   | HEAT SINK          | AL EX                   |
| M211C | 7178301212   | SCREW TAPPITTE      | TT2 WAS 3X12 MFZN BK      | I801B | 7174301211   | SCREW TAPPITTE     | TT2 RND 3X12 MFZN       |
| M211D | 7172401612   | SCREW TAPPITTE      | TT2 TRS 4X16 MFZN BK      | I804  | 1LTV817C---  | IC PHOTO COUPLER   | LTV-817C                |
| M231  | 4952301301   | PANEL CTRL          | HIPS PAINT                | I806  | 1SE130N---   | IC                 | SE130N                  |
| M353  | 4853535600   | HOLDER CORD         | NYROLN 66                 | I810  | TX0202DA---  | THYRISTOR          | X0202DA1BA2             |
| M481  | 4954801001   | BUTTON POWER        | ABS PAINT                 | I820  | 1KA7805---   | IC REGULATOR       | KA7805                  |
| M481A | 4856716000   | SPRING              | SWPA PIE0.5               | I820A | 4857026901   | HEAT SINK          | AL EX BK                |
| M541  | 4955400100   | SPEC PLATE          | P.E FILM 91.5X63          | I820B | 7174300811   | SCREW TAPPITTE     | TT2 RND 3X8 MFZN        |
| M561  | 4855617400   | MARK BRAND          | CU AU+ABS BK              | I822  | 1KA7808---   | IC REGULATOR       | KA7808                  |
| M682  | 4856816300   | CLAMP WIRE          | NYLON 6 (V0)              | I822A | 4857026901   | HEAT SINK          | AL EX BK                |
| S601  | 4858315610   | SPEAKER             | SP-5090F13                | I822B | 7174300811   | SCREW TAPPITTE     | TT2 RND 3X8 MFZN        |
| S601A | 7178301212   | SCREW TAPPITTE      | TT2 WAS 3X12 MFZN BK      | I823  | 1KA7805---   | IC REGULATOR       | KA7805                  |
| S601R | 4850703S52   | CONNECTOR           | YH025-03+35098+ULW=400    | IA01  | 1MM1118---   | IC AV SWITCH       | MM1118                  |
| S602  | 4858315610   | SPEAKER             | SP-5090F13                | JPA1  | 4959103680   | JACK SCART         | DSAM-0266               |
| S602A | 7178301212   | SCREW TAPPITTE      | TT2 WAS 3X12 MFZN BK      | JPA2  | 4959103680   | JACK SCART         | DSAM-0266               |
| S602L | 4850703S54   | CONNECTOR           | YH025-03+35098+ULW=600    | L150  | 58E0000041   | COIL AFT           | TRF-A005                |
| V901  | 4859639160   | CRT                 | W76ERF042X013             | L380  | 5MC0000085   | COIL CHOKE         | CH-100A                 |
| V901A | 4850706N14   | CONNECTOR           | YFSH500-06+YH396V+ULW=600 | L381  | 5MC0000085   | COIL CHOKE         | CH-100A                 |
| ZZ200 | PEFMSJD037   | MASK FRONT AS       | DSC-3220E                 | L401  | 58H0000077   | COIL H-LINEARITY   | TRL-40A1                |
| M201  | 4952002401   | MASK FRONT          | HIPS PAINT                | L402  | 58CD000022   | COIL CHOKE         | CH-700A                 |
| M201E | 4857817610   | CLOTH BLACK         | FELT 300X20X0.7           | L802  | 58C9430599   | COIL CHOKE         | AZ-9004Y(94MH)          |
| ZZ300 | PEMPMSD037   | PCB MAIN MANUAL AS  | DSC-3220E                 | LF801 | 5PLF3020---  | FILTER LINE        | LF-3020                 |
| 10    | 2193102005   | SOLDER BAR          | SN:PB=63:47 S63S-1320     | M351  | 4953500100   | HOLDER CORD        | FR HIPS                 |
| 30    | 2291050616   | FLUX SOLDER         | JS-64T3                   | M351A | 7172401612   | SCREW TAPPITTE     | TT2 TRS 4X16 MFZN BK    |
| 40    | 2291050301   | FLUX SOLVENT        | IM-1000                   | M381  | 4953802800   | FRAME MAIN PCB     | FR HIPS BK              |
| C402  | CMYH3C562J   | C MYLAR             | 1.6KV BUP 5600PF J        | M381A | 7178301212   | SCREW TAPPITTE     | TT2 WAS 3X12 MFZN BK    |
| C403  | CMYH3C752J   | C MYLAR             | 1.6KV BUP 7500PF J        | M381B | 7178301212   | SCREW TAPPITTE     | TT2 WAS 3X12 MFZN BK    |
| C408  | CMYE2G274J   | C MYLAR             | 400V PU 0.27MF J          | M681  | 4856815400   | CLAMP WIRE         | NYLON 66                |
| C499  | CEYD1H689W   | C ELECTRO           | 50V RHD 6.8MF (16X35.5)   | M683  | 4856812001   | TIE CABLE          | NYLON66 DA100           |
| C801  | CL1UC3474M   | C LINE ACROSS       | 0.47MF 1J(UCVSNDV/SV)+Q/O | P402  | 4859240120   | CONN WAFER         | YFW500-06               |
| C805  | CEYN2G181P   | C ELECTRO           | 400V LHS 180MF (25X35)    | P404  | 4859238620   | CONN WAFER         | YPW500-02               |
| C812  | CH1BFE472M   | C CERA AC           | AC400V 4700PF M U/C/V     | P800  | 4859907410   | CORD POWER AS      | M5206+TER=2250          |
| C813  | CEXF2E101V   | C ELECTRO           | 250V RSS 100MF 18X35.5    | M207  | 4853535500   | HOLDER AC CORD     | NYLON 66                |

| z_loc | z_parts_code | parts_name        | parts_descr                 |
|-------|--------------|-------------------|-----------------------------|
| M222  | 4859906111   | CORD POWER        | M5206+H03VVH2-F=2250        |
| M222T | 4857417700   | TERM CLAMP        | PT-01-T3                    |
| Q401  | T2SD1880—    | TR                | 2SD1880                     |
| Q401A | 4857024500   | HEAT SINK         | AL EX B/K                   |
| Q401B | 7174300811   | SCREW TAPPTITE    | TT2 RND 3X8 MFZN            |
| R801  | DPC7R0M290   | POSISTOR          | 2322 662 96709              |
| R819  | RX10T339J-   | R CEMENT          | 10W 3.3 OHM J TRIPOD        |
| RB02  | RV4121103P   | R SEMI FIXED      | NVZ6THT 10K OHM             |
| SF01  | 5PK3953M—    | FILTER SAW        | K3953M                      |
| SF02  | 5PK9650M—    | FILTER SAW        | K9650M                      |
| T401  | 50D19A1—     | TRANS DRIVE       | TD-19A1                     |
| T402  | 5DH0000028   | FBT               | LTC-305                     |
| T801  | 50M4936B2-   | TRANS SMPS        | 2094.0057                   |
| T803  | 58CD000023   | COIL CHOKE HYBRID | HCA208-049A                 |
| U100  | 4859721530   | TUNER VARACTOR    | DT5-BF18D N                 |
| X501  | 5XE20R250E   | CRYSTAL QUARTZ    | HC-49/U 20.2500MHZ 30PPM    |
| X601  | 5XE18R432E   | CRYSTAL QUARTZ    | HC-49/U 18.43200MHZ 30PPM   |
| Z101  | 5PMKT40MA-   | FILTER CERA       | MKT40MA100P                 |
| Z153  | 5PYXT5R5MB   | FILTER CERA       | XT 5.5MB                    |
| ZZ200 | PEMPJ0D037   | PCB MAIN (RHU) AS | DSC-3220E                   |
| C315  | CEXF2C470C   | C ELECTRO         | 160V RUS 47MF (13X25) TP    |
| C415  | CEXF2E479V   | C ELECTRO         | 250V RSS 4.7MF (10X16)TP    |
| C430  | CCXB3D681K   | C CERA            | 2KV B 680PF K (TAPPING)     |
| C440  | CMXE2G273J   | C MYLAR           | 400V PU 0.027MF J (TP)      |
| C502  | CEXF1C102V   | C ELECTRO         | 16V RSS 1000MF (10X20) TP   |
| C553  | CEXF1C102V   | C ELECTRO         | 16V RSS 1000MF (10X20) TP   |
| C604  | CEXF1E102V   | C ELECTRO         | 25V RSS 1000MF (13X20) TP   |
| C811  | CCXB3D681K   | C CERA            | 2KV B 680PF K (TAPPING)     |
| C814  | CEXF2E470V   | C ELECTRO         | 250V RSS 47MF (16X25) TP    |
| C823  | CEXF1E102V   | C ELECTRO         | 25V RSS 1000MF (13X20) TP   |
| C832  | CEXF1E102V   | C ELECTRO         | 25V RSS 1000MF (13X20) TP   |
| C840  | CEXF1C222V   | C ELECTRO         | 16V RSS 2200MF (16X31.5) TP |
| C841  | CEXF1C332V   | C ELECTRO         | 16V RSS 3300MF (16X25) TP   |
| C861  | CEXF1E102C   | C ELECTRO         | 25V RUS 1000MF (13X20) TP   |
| ZZ200 | PEMPJBD037   | PCB MAIN M-10 AS  | DSC-3220E                   |
| E001  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E002  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E003  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E004  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E005  | 4856310300   | EYE LET           | BSR T0.2 (R1.6)             |
| E006  | 4856310300   | EYE LET           | BSR T0.2 (R1.6)             |
| E007  | 4856310300   | EYE LET           | BSR T0.2 (R1.6)             |
| E008  | 4856310300   | EYE LET           | BSR T0.2 (R1.6)             |
| E009  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E010  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E011  | 4856310300   | EYE LET           | BSR T0.2 (R1.6)             |
| E012  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E013  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E014  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E015  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E016  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |
| E017  | 4856310600   | EYE LET           | BSR T0.2 (R2.3)             |

| z_loc | z_parts_code | parts_name     | parts_descr            |
|-------|--------------|----------------|------------------------|
| E018  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E019  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E020  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E021  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E022  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E023  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E024  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E025  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E026  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E027  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E028  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E029  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E030  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E031  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E032  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E033  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E034  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E035  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E037  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E038  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E039  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E040  | 4856310600   | EYE LET        | BSR T0.2 (R2.3)        |
| E041  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E042  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E043  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E044  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E045  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E046  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E047  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E048  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| E049  | 4856310300   | EYE LET        | BSR T0.2 (R1.6)        |
| P102  | 485923162S   | CONN WAFER     | YW025-03 (STICK)       |
| P401  | 485923172S   | CONN WAFER     | YW025-04 (STICK)       |
| P403  | 485923202S   | CONN WAFER     | YW025-07 (STICK)       |
| P501  | 485923182S   | CONN WAFER     | YW025-05 (STICK)       |
| P502  | 485923162S   | CONN WAFER     | YW025-03 (STICK)       |
| P603  | 485923172S   | CONN WAFER     | YW025-04 (STICK)       |
| P701  | 485923512S   | CONN WAFER     | YW025-08 (STICK)       |
| P801A | 4857417500   | TERM PIN       | DA-IB0214(D2.3/DY PIN) |
| P801B | 4857417500   | TERM PIN       | DA-IB0214(D2.3/DY PIN) |
| P802A | 4857417500   | TERM PIN       | DA-IB0214(D2.3/DY PIN) |
| P802B | 4857417500   | TERM PIN       | DA-IB0214(D2.3/DY PIN) |
| P803A | 4857417500   | TERM PIN       | DA-IB0214(D2.3/DY PIN) |
| P803B | 4857417500   | TERM PIN       | DA-IB0214(D2.3/DY PIN) |
| PA01  | 485923522S   | CONN WAFER     | YW025-09 (STICK)       |
| R399  | RS02Z180JS   | R M-OXIDE FILM | 2W 18 OHM J SMALL      |
| R406  | RS02Z681JS   | R M-OXIDE FILM | 2W 680 OHM J SMALL     |
| R415  | RS02Z102JS   | R M-OXIDE FILM | 2W 1K OHM J SMALL      |
| R450  | RS02Z223JS   | R M-OXIDE FILM | 2W 22K OHM J SMALL     |
| R802  | RS02Z753JS   | R M-OXIDE FILM | 2W 75K OHM J SMALL     |
| R803  | RS02Z473JS   | R M-OXIDE FILM | 2W 47K OHM J SMALL     |
| R804  | RS02Z158J-   | R M-OXIDE FILM | 2W 0.15 OHM J          |

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| z_loc | z_parts_code | parts_name         | parts_descr               | z_loc | z_parts_code | parts_name   | parts_descr               |
|-------|--------------|--------------------|---------------------------|-------|--------------|--------------|---------------------------|
| R850  | RS02Z129JS   | R M-OXIDE FILM     | 2W 1.2 OHM J SMALL        | C623  | CEXF1H109V   | C ELECTRO    | 50V RSS 1MF (5X11) TP     |
| R890  | RS02Z683J-   | R M-OXIDE FILM     | 2W 68K OHM J (TAPPING)    | C624  | CEXF1H109V   | C ELECTRO    | 50V RSS 1MF (5X11) TP     |
| SP01  | 485923162S   | CONN WAFER         | YW025-03 (STICK)          | C625  | CEXF1E101V   | C ELECTRO    | 25V RSS 100MF (6.3X11) TP |
| SP02  | 485923162S   | CONN WAFER         | YW025-03 (STICK)          | C626  | CEXF1E101V   | C ELECTRO    | 25V RSS 100MF (6.3X11) TP |
| ZZ200 | PEMPJRD037   | PCB MAIN RADIAL AS | DSC-3220E                 | C627  | CEXF1E470V   | C ELECTRO    | 25V RSS 47MF (5X11) TP    |
| C102  | CEXF1H470V   | C ELECTRO          | 50V RSS 47MF (6.3X11) TP  | C628  | CEXF1E470V   | C ELECTRO    | 25V RSS 47MF (5X11) TP    |
| C106  | CEXF1C221V   | C ELECTRO          | 16V RSS 220MF (8X11.5) TP | C630  | CEXF1E470V   | C ELECTRO    | 25V RSS 47MF (5X11) TP    |
| C110  | CXCH1H150J   | C CERA             | 50V CH 15PF J (TAPPING)   | C632  | CEXF1E479A   | C ELECTRO    | 25V RSM 4.7MF             |
| C117  | CEXF1H229V   | C ELECTRO          | 50V RSS 2.2MF (5X11) TP   | C633  | CEXF1E479A   | C ELECTRO    | 25V RSM 4.7MF             |
| C118  | CMXL1J474J   | C MYLAR            | 63V MEU 0.47MF J          | C634  | CEXF1H100V   | C ELECTRO    | 50V RSS 10MF (5X11) TP    |
| C121  | CEXF1H100V   | C ELECTRO          | 50V RSS 10MF (5X11) TP    | C636  | CEXF1H470V   | C ELECTRO    | 50V RSS 47MF (6.3X11) TP  |
| C152  | CEXF1H100V   | C ELECTRO          | 50V RSS 10MF (5X11) TP    | C638  | CEXF1H479V   | C ELECTRO    | 50V RSS 4.7MF (5X11) TP   |
| C153  | CEXF1H229V   | C ELECTRO          | 50V RSS 2.2MF (5X11) TP   | C639  | CEXF1H479V   | C ELECTRO    | 50V RSS 4.7MF (5X11) TP   |
| C156  | CBXF1H104Z   | C CERA SEMI        | 50V F 0.1MF Z (TAPPING)   | C641  | CEXF1E101V   | C ELECTRO    | 25V RSS 100MF (6.3X11) TP |
| C157  | CEXF1H100V   | C ELECTRO          | 50V RSS 10MF (5X11) TP    | C642  | CEXF1E101V   | C ELECTRO    | 25V RSS 100MF (6.3X11) TP |
| C158  | CBXF1H104Z   | C CERA SEMI        | 50V F 0.1MF Z (TAPPING)   | C660  | CEXF1C100A   | C ELECTRO    | 16V RSM 10MF 5X7          |
| C164  | CEXF1E470V   | C ELECTRO          | 25V RSS 47MF (5X11) TP    | C661  | CMXL1J224J   | C MYLAR      | 63V MEU 0.22MF J (TP)     |
| C301  | CMXL1J224J   | C MYLAR            | 63V MEU 0.22MF J (TP)     | C662  | CMXL1J224J   | C MYLAR      | 63V MEU 0.22MF J (TP)     |
| C305  | CEXF1E221V   | C ELECTRO          | 25V RSS 220MF (8X11.5) TP | C665  | CCXB1H222K   | C CERA       | 50V B 2200PF K (TAPPING)  |
| C313  | CMXL1J104J   | C MYLAR            | 63V MEU 0.1MF J           | C666  | CBXF1H104Z   | C CERA SEMI  | 50V F 0.1MF Z (TAPPING)   |
| C320  | CBXF1H104Z   | C CERA SEMI        | 50V F 0.1MF Z (TAPPING)   | C667  | CCXB1H222K   | C CERA       | 50V B 2200PF K (TAPPING)  |
| C340  | CMXL1J683J   | C MYLAR            | 63V MEU 0.068MF J         | C668  | CMXL1J224J   | C MYLAR      | 63V MEU 0.22MF J (TP)     |
| C350  | CMXL1J103J   | C MYLAR            | 63V MEU 0.01MF J          | C669  | CMXL1J224J   | C MYLAR      | 63V MEU 0.22MF J (TP)     |
| C351  | CMXL1J103J   | C MYLAR            | 63V MEU 0.01MF J          | C670  | CEXF1H100V   | C ELECTRO    | 50V RSS 10MF (5X11) TP    |
| C401  | CEXF1H101V   | C ELECTRO          | 50V RSS 100MF (8X11.5) TP | C770  | CEXF1C101V   | C ELECTRO    | 16V RSS 100MF (6.3X11) TP |
| C412  | CEXF2C339V   | C ELECTRO          | 160V RSS 3.3MF (8X16) TP  | C803  | CCXF3A472Z   | C CERA       | 1KV F 4700PF Z (T)        |
| C418  | CCXB1H102K   | C CERA             | 50V B 1000PF K (TAPPING)  | C804  | CCXF3A472Z   | C CERA       | 1KV F 4700PF Z (T)        |
| C420  | CCXB2H222K   | C CERA             | 500V B 2200PF K (TAPPING) | C806  | CEXF1H330V   | C ELECTRO    | 50V RSS 33MF (6.3X11) TP  |
| C424  | CMXM2A333J   | C MYLAR            | 100V 0.033MF J (TP)       | C807  | CCXF1H473Z   | C CERA       | 50V F 0.047MF Z (TAPPING) |
| C431  | CMXM2A103J   | C MYLAR            | 100V 0.01MF J (TP)        | C808  | CEXF1H100V   | C ELECTRO    | 50V RSS 10MF (5X11) TP    |
| C504  | CEXF1H470V   | C ELECTRO          | 50V RSS 47MF (6.3X11) TP  | C809  | CCXB1H102K   | C CERA       | 50V B 1000PF K (TAPPING)  |
| C508  | CEXF1H220V   | C ELECTRO          | 50V RSS 22MF (5X11) TP    | C820  | CCXB3A471K   | C CERA       | 1KV B 470PF K (T)         |
| C511  | CEXF1H100V   | C ELECTRO          | 50V RSS 10MF (5X11) TP    | C821  | CCXB2H102K   | C CERA       | 500V B 1000PF K (TAPPING) |
| C519  | CEXF1H109V   | C ELECTRO          | 50V RSS 1MF (5X11) TP     | C824  | CCXB3A471K   | C CERA       | 1KV B 470PF K (T)         |
| C520  | CEXF1H109V   | C ELECTRO          | 50V RSS 1MF (5X11) TP     | C825  | CCXB2H101K   | C CERA       | 500V B 100PF K (TAPPING)  |
| C521  | CEXF1H109V   | C ELECTRO          | 50V RSS 1MF (5X11) TP     | C831  | CCXB3A471K   | C CERA       | 1KV B 470PF K (T)         |
| C522  | CEXF1H109V   | C ELECTRO          | 50V RSS 1MF (5X11) TP     | C835  | CEXF1H470V   | C ELECTRO    | 50V RSS 47MF (6.3X11) TP  |
| C525  | CEXF1H220V   | C ELECTRO          | 50V RSS 22MF (5X11) TP    | C844  | CEXF1E101V   | C ELECTRO    | 25V RSS 100MF (6.3X11) TP |
| C546  | CEXF1H339V   | C ELECTRO          | 50V RSS 3.3MF (5X11) TP   | C850  | CCXB1H821K   | C CERA       | 50V B 820PF K (TAPPING)   |
| C549  | CEXF1H229V   | C ELECTRO          | 50V RSS 2.2MF (5X11) TP   | C863  | CEXF1E101V   | C ELECTRO    | 25V RSS 100MF (6.3X11) TP |
| C597  | CEXF1H220V   | C ELECTRO          | 50V RSS 22MF (5X11) TP    | C866  | CCXB3A471K   | C CERA       | 1KV B 470PF K (T)         |
| C602  | CEXF1E221V   | C ELECTRO          | 25V RSS 220MF (8X11.5) TP | CA12  | CEXF1H100V   | C ELECTRO    | 50V RSS 10MF (5X11) TP    |
| C605  | CEXF1E470V   | C ELECTRO          | 25V RSS 47MF (5X11) TP    | CA33  | CEXF1H100V   | C ELECTRO    | 50V RSS 10MF (5X11) TP    |
| C608  | CEXF1H100V   | C ELECTRO          | 50V RSS 10MF (5X11) TP    | F801A | 4857415001   | CLIP FUSE    | PFC5000-0702              |
| C610  | CEXF1H100V   | C ELECTRO          | 50V RSS 10MF (5X11) TP    | F801B | 4857415001   | CLIP FUSE    | PFC5000-0702              |
| C611  | CEXF1H339V   | C ELECTRO          | 50V RSS 3.3MF (5X11) TP   | I805  | 1K1A7042AP   | IC REGULATOR | KIA7042AP                 |
| C612  | CEXF1H109V   | C ELECTRO          | 50V RSS 1MF (5X11) TP     | Q103  | TKTC3198Y-   | TR           | KTC3198Y                  |
| C613  | CEXF1H109V   | C ELECTRO          | 50V RSS 1MF (5X11) TP     | Q104  | TKTC3198Y-   | TR           | KTC3198Y                  |
| C614  | CEXF1H109V   | C ELECTRO          | 50V RSS 1MF (5X11) TP     | Q120  | TKTC3198Y-   | TR           | KTC3198Y                  |
| C615  | CEXF1H109V   | C ELECTRO          | 50V RSS 1MF (5X11) TP     | Q150  | TKTC3198Y-   | TR           | KTC3198Y                  |
| C616  | CEXF1H100V   | C ELECTRO          | 50V RSS 10MF (5X11) TP    | Q151  | TKTC3198Y-   | TR           | KTC3198Y                  |
| C619  | CEXF1E221V   | C ELECTRO          | 25V RSS 220MF (8X11.5) TP | Q333  | TKTC3198Y-   | TR           | KTC3198Y                  |



| z_loc | z_parts_code | parts_name        | parts_descr             |
|-------|--------------|-------------------|-------------------------|
| Q334  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q402  | T2SD1207T-   | TR                | 2SD1207-T (TAPPING)     |
| Q510  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q511  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q542  | TKTA1266Y-   | TR                | KTA1266Y (TP)           |
| Q543  | TKTA1266Y-   | TR                | KTA1266Y (TP)           |
| Q544  | TKTA1266Y-   | TR                | KTA1266Y (TP)           |
| Q550  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q599  | TKTA1266Y-   | TR                | KTA1266Y (TP)           |
| Q601  | TKTA1266Y-   | TR                | KTA1266Y (TP)           |
| Q702  | TKTA1266Y-   | TR                | KTA1266Y (TP)           |
| Q703  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q807  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q808  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q809  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q810  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q811  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q850  | TKTC3198Y-   | TR                | KTC3198Y                |
| Q851  | TKTC3198Y-   | TR                | KTC3198Y                |
| QA01  | TKTC3198Y-   | TR                | KTC3198Y                |
| RB10  | RV5426103P   | R SEMI FIXED      | ENV-DJAA03B14 10K OHM B |
| Z603  | 5PXF1B471M   | FILTER EMI        | CFI 06 B 1H 470PF       |
| Z604  | 5PXF1B471M   | FILTER EMI        | CFI 06 B 1H 470PF       |
| Z605  | 5PXF1B471M   | FILTER EMI        | CFI 06 B 1H 470PF       |
| Z606  | 5PXF1B471M   | FILTER EMI        | CFI 06 B 1H 470PF       |
| Z607  | 5PXF1B471M   | FILTER EMI        | CFI 06 B 1H 470PF       |
| Z608  | 5PXF1B471M   | FILTER EMI        | CFI 06 B 1H 470PF       |
| ZZ200 | PEMPJAD037   | PCB MAIN AXIAL AS | DSC-3220E               |
| A001  | 4959812224   | PCB MAIN          | 330X246 D1B             |
| C101  | CCZB1H101K   | C CERA            | 50V B 100PF K (AXIAL)   |
| C103  | CCZB1H102K   | C CERA            | 50V B 1000PF K (AXIAL)  |
| C104  | CCZB1H102K   | C CERA            | 50V B 1000PF K (AXIAL)  |
| C116  | CBZF1H104Z   | C CERA SEMI       | 50V F 0.1MF Z           |
| C119  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C120  | CCZB1H102K   | C CERA            | 50V B 1000PF K (AXIAL)  |
| C151  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C154  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C160  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C161  | CZCH1H220J   | C CERA            | 50V CH 22PF J (AXIAL)   |
| C163  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C341  | CCZB1H102K   | C CERA            | 50V B 1000PF K (AXIAL)  |
| C370  | CCZF1H473Z   | C CERA            | 50V F 0.047MF Z         |
| C500  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C501  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C503  | CBZF1H104Z   | C CERA SEMI       | 50V F 0.1MF Z           |
| C506  | CBZF1H104Z   | C CERA SEMI       | 50V F 0.1MF Z           |
| C507  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C509  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C510  | CCZF1H473Z   | C CERA            | 50V F 0.047MF Z         |
| C512  | CCZF1H103Z   | C CERA            | 50V F 0.01MF Z          |
| C513  | CCZB1H471K   | C CERA            | 50V B 470PF K (AXIAL)   |
| C516  | CCZB1H102K   | C CERA            | 50V B 1000PF K (AXIAL)  |

| z_loc | z_parts_code | parts_name  | parts_descr            |
|-------|--------------|-------------|------------------------|
| C526  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C528  | CCZF1H223Z   | C CERA      | 50V F 0.022MF Z        |
| C529  | CCZF1H223Z   | C CERA      | 50V F 0.022MF Z        |
| C530  | CCZF1H223Z   | C CERA      | 50V F 0.022MF Z        |
| C534  | CCZB1H333K   | C CERA      | 50V B 0.033MF K AXL    |
| C535  | CCZB1H333K   | C CERA      | 50V B 0.033MF K AXL    |
| C536  | CCZB1H333K   | C CERA      | 50V B 0.033MF K AXL    |
| C547  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C548  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C554  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C560  | CCZB1H101K   | C CERA      | 50V B 100PF K (AXIAL)  |
| C561  | CCZB1H101K   | C CERA      | 50V B 100PF K (AXIAL)  |
| C568  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C571  | CCZB1H101K   | C CERA      | 50V B 100PF K (AXIAL)  |
| C578  | CCZB1H221K   | C CERA      | 50V B 220PF K (AXIAL)  |
| C579  | CCZB1H221K   | C CERA      | 50V B 220PF K (AXIAL)  |
| C581  | CCZB1H101K   | C CERA      | 50V B 100PF K (AXIAL)  |
| C585  | CCZB1H101K   | C CERA      | 50V B 100PF K (AXIAL)  |
| C587  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| C589  | CCZB1H221K   | C CERA      | 50V B 220PF K (AXIAL)  |
| C590  | CZCH1H309C   | C CERA      | 50V CH 3PF C (AXIAL)   |
| C591  | CZCH1H309C   | C CERA      | 50V CH 3PF C (AXIAL)   |
| C601  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| C603  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| C606  | CCZB1H222K   | C CERA      | 50V B 2200PF K AXIAL   |
| C607  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| C617  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C618  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| C620  | CZCH1H309C   | C CERA      | 50V CH 3PF C (AXIAL)   |
| C621  | CZCH1H309C   | C CERA      | 50V CH 3PF C (AXIAL)   |
| C622  | CZCH1H680J   | C CERA      | CH 50V 68PF J AXL 52MM |
| C629  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C631  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C635  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| C637  | CCZB1H222K   | C CERA      | 50V B 2200PF K AXIAL   |
| C650  | CZCH1H680J   | C CERA      | CH 50V 68PF J AXL 52MM |
| C690  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C691  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C702  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C830  | CBZF1H104Z   | C CERA SEMI | 50V F 0.1MF Z          |
| C888  | CCZF1H103Z   | C CERA      | 50V F 0.01MF Z         |
| CA01  | CCZB1H101K   | C CERA      | 50V B 100PF K (AXIAL)  |
| CA02  | CCZB1H101K   | C CERA      | 50V B 100PF K (AXIAL)  |
| CA03  | CCZB1H101K   | C CERA      | 50V B 100PF K (AXIAL)  |
| CA04  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| CA07  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| CA10  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| CA13  | CCZB1H471K   | C CERA      | 50V B 470PF K (AXIAL)  |
| CA14  | CCZB1H471K   | C CERA      | 50V B 470PF K (AXIAL)  |
| CA15  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| CA16  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |
| CA17  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) |

## Service manual SC-150

| z_loc | z_parts_code | parts_name  | parts_descr            | z_loc | z_parts_code | parts_name  | parts_descr              |
|-------|--------------|-------------|------------------------|-------|--------------|-------------|--------------------------|
| CA18  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) | D840  | D1N4148—     | DIODE       | 1N4148 (TAPPING)         |
| CA30  | CCZF1H103Z   | C CERA      | 50V F 0.01MF Z         | D841  | D1N4148—     | DIODE       | 1N4148 (TAPPING)         |
| CA31  | CCZF1H103Z   | C CERA      | 50V F 0.01MF Z         | D850  | DUZ2R7B—     | DIODE ZENER | UZ-2.7B                  |
| CA34  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) | D890  | DRU1P—       | DIODE       | RU1P                     |
| CA35  | CCZB1H102K   | C CERA      | 50V B 1000PF K (AXIAL) | DA03  | DUZ5R1BM—    | DIODE ZENER | UZ-5.1BM                 |
| CA37  | CCZB1H561K   | C CERA      | 50V B 560PF K          | DA06  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| CA38  | CCZB1H561K   | C CERA      | 50V B 560PF K          | DA07  | DUZ5R1BM—    | DIODE ZENER | UZ-5.1BM                 |
| D100  | DUZ33B—      | DIODE ZENER | UZ-33B                 | DA08  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| D101  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | DA09  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| D103  | DBA282—      | DIODE       | BA282                  | DA1   | DUZ5R1BM—    | DIODE ZENER | UZ-5.1BM                 |
| D313  | DRGP15J—     | DIODE       | RGP15J                 | DA10  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| D351  | DUZ12BM—     | DIODE ZENER | UZ-12BM (UNIZON)       | DA11  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| D360  | DUZ22BM—     | DIODE ZENER | UZ-22BM                | DA15  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| D361  | DUZ33B—      | DIODE ZENER | UZ-33B                 | DA16  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| D362  | DUZ33B—      | DIODE ZENER | UZ-33B                 | DA20  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| D367  | DUZ33B—      | DIODE ZENER | UZ-33B                 | DA27  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| D405  | DRGP15J—     | DIODE       | RGP15J                 | DA32  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM                 |
| D407  | DRGP15J—     | DIODE       | RGP15J                 | J101  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D408  | DRGP15J—     | DIODE       | RGP15J                 | J103  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D410  | D1N4004S—    | DIODE       | 1N4004S                | J104  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D411  | D1N4004S—    | DIODE       | 1N4004S                | J105  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D450  | DRGP15J—     | DIODE       | RGP15J                 | J106  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D520  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J107  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D521  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J108  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D533  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J109  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D534  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J110  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D537  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J111  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D550  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J112  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D551  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J113  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D591  | DUZ2R7B—     | DIODE ZENER | UZ-2.7B                | J114  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D597  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J115  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D598  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J116  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D599  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM               | J117  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D601  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J118  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D602  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J119  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D603  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J120  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D604  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J121  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D700  | DUZ5R6BM—    | DIODE ZENER | UZ-5.6BM               | J122  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D801  | DLT2A05G—    | DIODE       | LT2A05G (TP)           | J123  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D802  | DLT2A05G—    | DIODE       | LT2A05G (TP)           | J124  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D803  | DLT2A05G—    | DIODE       | LT2A05G (TP)           | J125  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D804  | DLT2A05G—    | DIODE       | LT2A05G (TP)           | J126  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D805  | DRGP15J—     | DIODE       | RGP15J                 | J127  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D806  | DRGP15J—     | DIODE       | RGP15J                 | J128  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D808  | DRGP15J—     | DIODE       | RGP15J                 | J129  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D809  | DRGP15J—     | DIODE       | RGP15J                 | J130  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D811  | DUZ6R2BM—    | DIODE ZENER | UZ-6.2BM               | J131  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D821  | DRGP15J—     | DIODE       | RGP15J                 | J132  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D824  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J133  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D825  | D1N4148—     | DIODE       | 1N4148 (TAPPING)       | J134  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D830  | DRGP15J—     | DIODE       | RGP15J                 | J135  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |
| D831  | DRGP15J—     | DIODE       | RGP15J                 | J136  | 85801065GY   | WIRE COPPER | AWG22 1/0.65 TIN COATING |

| z_loc | z_parts_code | parts_name    | parts_descr              |
|-------|--------------|---------------|--------------------------|
| J137  | RD-AZ471J-   | R CARBON FILM | 1/6 470 OHM J            |
| J138  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J139  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J140  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J141  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J142  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J143  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J144  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J145  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J146  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J147  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J148  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J149  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J150  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J151  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J152  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J153  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J154  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J155  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J156  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J158  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J159  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J160  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J161  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J162  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J163  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J164  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J165  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J166  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J167  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J168  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J169  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J170  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J171  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J173  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J174  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J175  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J176  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J177  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J178  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J179  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J180  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J181  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J182  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J183  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J184  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J185  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J186  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J187  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J188  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J189  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J190  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |

| z_loc | z_parts_code | parts_name    | parts_descr              |
|-------|--------------|---------------|--------------------------|
| J191  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J192  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J193  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J194  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J195  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J196  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J197  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J198  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J199  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J202  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J203  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J204  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J205  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J206  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J207  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J208  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J209  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| J210  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| L101  | 5CPZ479K02   | COIL PEAKING  | 4.7UH K (AXIAL 3.5MM)    |
| L105  | 5CPZ479K02   | COIL PEAKING  | 4.7UH K (AXIAL 3.5MM)    |
| L153  | 5CPZ120K02   | COIL PEAKING  | 12UH K (AXIAL 3.5MM)     |
| L501  | 5CPZ479K02   | COIL PEAKING  | 4.7UH K (AXIAL 3.5MM)    |
| L502  | 5CPZ479K02   | COIL PEAKING  | 4.7UH K (AXIAL 3.5MM)    |
| L503  | 5CPZ479K02   | COIL PEAKING  | 4.7UH K (AXIAL 3.5MM)    |
| L504  | 5CPZ479K02   | COIL PEAKING  | 4.7UH K (AXIAL 3.5MM)    |
| L601  | 5CPZ479K02   | COIL PEAKING  | 4.7UH K (AXIAL 3.5MM)    |
| L602  | 5CPZ479K02   | COIL PEAKING  | 4.7UH K (AXIAL 3.5MM)    |
| L605  | 5CPZ479K02   | COIL PEAKING  | 4.7UH K (AXIAL 3.5MM)    |
| L650  | 5MC0000100   | COIL BEAD     | HC-3550                  |
| L801  | 5MC0000100   | COIL BEAD     | HC-3550                  |
| LA01  | 5CPZ100K04   | COIL PEAKING  | 10UH 10.5MM K (LAL04TB)  |
| LA02  | 5CPZ100K04   | COIL PEAKING  | 10UH 10.5MM K (LAL04TB)  |
| LA03  | 5CPZ100K04   | COIL PEAKING  | 10UH 10.5MM K (LAL04TB)  |
| LA04  | 5CPZ100K04   | COIL PEAKING  | 10UH 10.5MM K (LAL04TB)  |
| LA30  | 5MC0000100   | COIL BEAD     | HC-3550                  |
| R101  | RD-AZ222J-   | R CARBON FILM | 1/6 2.2K OHM J           |
| R103  | RD-AZ123J-   | R CARBON FILM | 1/6 12K OHM J            |
| R104  | RD-AZ104J-   | R CARBON FILM | 1/6 100K OHM J           |
| R105  | RD-AZ272J-   | R CARBON FILM | 1/6 2.7K OHM J           |
| R106  | RD-AZ561J-   | R CARBON FILM | 1/6 560 OHM J            |
| R107  | RD-AZ561J-   | R CARBON FILM | 1/6 560 OHM J            |
| R110  | RD-AZ682J-   | R CARBON FILM | 1/6 6.8K OHM J           |
| R111  | RD-AZ222J-   | R CARBON FILM | 1/6 2.2K OHM J           |
| R116  | RD-AZ682J-   | R CARBON FILM | 1/6 6.8K OHM J           |
| R117  | RD-AZ682J-   | R CARBON FILM | 1/6 6.8K OHM J           |
| R118  | RD-AZ151J-   | R CARBON FILM | 1/6 150 OHM J            |
| R131  | RD-AZ472J-   | R CARBON FILM | 1/6 4.7K OHM J           |
| R151  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J             |
| R152  | RD-AZ271J-   | R CARBON FILM | 1/6 270 OHM J            |
| R153  | RD-AZ470J-   | R CARBON FILM | 1/6 47 OHM J             |
| R154  | RD-AZ470J-   | R CARBON FILM | 1/6 47 OHM J             |
| R155  | RD-AZ751J-   | R CARBON FILM | 1/6 750 OHM J            |

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| z_loc | z_parts_code | parts_name    | parts_descr     | z_loc | z_parts_code | parts_name    | parts_descr    |
|-------|--------------|---------------|-----------------|-------|--------------|---------------|----------------|
| R160  | RD-AZ472J-   | R CARBON FILM | 1/6 4.7K OHM J  | R543  | RD-AZ241J-   | R CARBON FILM | 1/6 240 OHM J  |
| R161  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J    | R544  | RD-AZ202J-   | R CARBON FILM | 1/6 2K OHM J   |
| R162  | RD-AZ153J-   | R CARBON FILM | 1/6 15K OHM J   | R548  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J  |
| R163  | RD-AZ752J-   | R CARBON FILM | 1/6 7.5K OHM J  | R550  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R164  | RD-AZ752J-   | R CARBON FILM | 1/6 7.5K OHM J  | R555  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R177  | RD-AZ562J-   | R CARBON FILM | 1/6 5.6K OHM J  | R560  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R190  | RD-AZ221J-   | R CARBON FILM | 1/6 220 OHM J   | R561  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R191  | RD-AZ331J-   | R CARBON FILM | 1/6 330 OHM J   | R562  | RD-AZ152J-   | R CARBON FILM | 1/6 1.5K OHM J |
| R301  | RD-4Z472J-   | R CARBON FILM | 1/4 4.7K OHM J  | R563  | RD-AZ152J-   | R CARBON FILM | 1/6 1.5K OHM J |
| R302  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J   | R566  | RD-AZ220J-   | R CARBON FILM | 1/6 22 OHM J   |
| R310  | RD-AZ392J-   | R CARBON FILM | 1/6 3.9K OHM J  | R568  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R311  | RD-AZ392J-   | R CARBON FILM | 1/6 3.9K OHM J  | R569  | RD-AZ181J-   | R CARBON FILM | 1/6 180 OHM J  |
| R330  | RD-4Z473J-   | R CARBON FILM | 1/4 47K OHM J   | R570  | RD-AZ271J-   | R CARBON FILM | 1/6 270 OHM J  |
| R331  | RD-2Z201J-   | R CARBON FILM | 1/2 200 OHM J   | R572  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R333  | RD-AZ222J-   | R CARBON FILM | 1/6 2.2K OHM J  | R573  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R334  | RD-AZ222J-   | R CARBON FILM | 1/6 2.2K OHM J  | R576  | RD-AZ181J-   | R CARBON FILM | 1/6 180 OHM J  |
| R340  | RD-4Z334J-   | R CARBON FILM | 1/4 330K OHM J  | R577  | RD-AZ181J-   | R CARBON FILM | 1/6 180 OHM J  |
| R341  | RD-4Z333J-   | R CARBON FILM | 1/4 33K OHM J   | R578  | RD-AZ330J-   | R CARBON FILM | 1/6 33 OHM J   |
| R350  | RN-4Z2701F   | R METAL FILM  | 1/4 2.70K OHM F | R579  | RD-AZ330J-   | R CARBON FILM | 1/6 33 OHM J   |
| R351  | RN-4Z2701F   | R METAL FILM  | 1/4 2.70K OHM F | R580  | RD-AZ271J-   | R CARBON FILM | 1/6 270 OHM J  |
| R370  | RD-4Z159J-   | R CARBON FILM | 1/4 1.5 OHM J   | R582  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R394  | RD-AZ272J-   | R CARBON FILM | 1/6 2.7K OHM J  | R583  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R395  | RD-4Z394J-   | R CARBON FILM | 1/4 390K OHM J  | R586  | RD-AZ271J-   | R CARBON FILM | 1/6 270 OHM J  |
| R396  | RD-AZ272J-   | R CARBON FILM | 1/6 2.7K OHM J  | R587  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R397  | RD-AZ104J-   | R CARBON FILM | 1/6 100K OHM J  | R588  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R398  | RD-2Z109J-   | R CARBON FILM | 1/2 1 OHM J     | R589  | RD-AZ330J-   | R CARBON FILM | 1/6 33 OHM J   |
| R401  | RD-4Z272J-   | R CARBON FILM | 1/4 2.7K OHM J  | R590  | RD-4Z473J-   | R CARBON FILM | 1/4 47K OHM J  |
| R402  | RD-4Z220J-   | R CARBON FILM | 1/4 22 OHM J    | R591  | RD-AZ431J-   | R CARBON FILM | 1/6 430 OHM J  |
| R403  | RD-4Z472J-   | R CARBON FILM | 1/4 4.7K OHM J  | R592  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R404  | RD-2Z399J-   | R CARBON FILM | 1/2 3.9 OHM J   | R593  | RD-AZ104J-   | R CARBON FILM | 1/6 100K OHM J |
| R420  | RD-2Z152J-   | R CARBON FILM | 1/2 1.5K OHM J  | R594  | RD-AZ222J-   | R CARBON FILM | 1/6 2.2K OHM J |
| R444  | RD-2Z229J-   | R CARBON FILM | 1/2 2.2 OHM J   | R595  | RD-AZ682J-   | R CARBON FILM | 1/6 6.8K OHM J |
| R500  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J   | R596  | RD-AZ472J-   | R CARBON FILM | 1/6 4.7K OHM J |
| R501  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J   | R597  | RD-AZ153J-   | R CARBON FILM | 1/6 15K OHM J  |
| R502  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J   | R598  | RD-AZ153J-   | R CARBON FILM | 1/6 15K OHM J  |
| R503  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J   | R599  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R504  | RD-AZ473J-   | R CARBON FILM | 1/6 47K OHM J   | R601  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R506  | RD-AZ223J-   | R CARBON FILM | 1/6 22K OHM J   | R602  | RD-AZ104J-   | R CARBON FILM | 1/6 100K OHM J |
| R507  | RD-AZ562J-   | R CARBON FILM | 1/6 5.6K OHM J  | R603  | RD-AZ473J-   | R CARBON FILM | 1/6 47K OHM J  |
| R508  | RD-AZ562J-   | R CARBON FILM | 1/6 5.6K OHM J  | R604  | RD-AZ223J-   | R CARBON FILM | 1/6 22K OHM J  |
| R509  | RD-AZ472J-   | R CARBON FILM | 1/6 4.7K OHM J  | R605  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R511  | RD-AZ273J-   | R CARBON FILM | 1/6 27K OHM J   | R606  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| R517  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J    | R607  | RD-AZ473J-   | R CARBON FILM | 1/6 47K OHM J  |
| R518  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J    | R610  | RD-AZ473J-   | R CARBON FILM | 1/6 47K OHM J  |
| R530  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J   | R611  | RD-AZ473J-   | R CARBON FILM | 1/6 47K OHM J  |
| R532  | RD-AZ223J-   | R CARBON FILM | 1/6 22K OHM J   | R612  | RD-AZ223J-   | R CARBON FILM | 1/6 22K OHM J  |
| R533  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J   | R613  | RD-4Z220J-   | R CARBON FILM | 1/4 22 OHM J   |
| R535  | RD-AZ201J-   | R CARBON FILM | 1/6 200 OHM J   | R614  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R537  | RD-AZ201J-   | R CARBON FILM | 1/6 200 OHM J   | R615  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R540  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J   | R616  | RD-4Z220J-   | R CARBON FILM | 1/4 22 OHM J   |
| R541  | RD-AZ122J-   | R CARBON FILM | 1/6 1.2K OHM J  | R617  | RD-AZ473J-   | R CARBON FILM | 1/6 47K OHM J  |
| R542  | RD-AZ303J-   | R CARBON FILM | 1/6 30K OHM J   | R620  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |

| z_loc | z_parts_code | parts_name    | parts_descr    |
|-------|--------------|---------------|----------------|
| R621  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R622  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R624  | RD-AZ472J-   | R CARBON FILM | 1/6 4.7K OHM J |
| R625  | RD-AZ472J-   | R CARBON FILM | 1/6 4.7K OHM J |
| R641  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R642  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R646  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R647  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R649  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R650  | RD-AZ752J-   | R CARBON FILM | 1/6 7.5K OHM J |
| R651  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R652  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R660  | RD-AZ752J-   | R CARBON FILM | 1/6 7.5K OHM J |
| R661  | RD-AZ912J-   | R CARBON FILM | 1/6 9.1K OHM J |
| R662  | RD-AZ912J-   | R CARBON FILM | 1/6 9.1K OHM J |
| R663  | RD-AZ100J-   | R CARBON FILM | 1/6 10 OHM J   |
| R664  | RD-AZ513J-   | R CARBON FILM | 1/6 51K OHM J  |
| R700  | RD-2Z332J-   | R CARBON FILM | 1/2 3.3K OHM J |
| R701  | RD-AZ152J-   | R CARBON FILM | 1/6 1.5K OHM J |
| R702  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J  |
| R703  | RD-AZ152J-   | R CARBON FILM | 1/6 1.5K OHM J |
| R704  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J  |
| R711  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J  |
| R720  | RD-AZ122J-   | R CARBON FILM | 1/6 1.2K OHM J |
| R805  | RD-2Z100J-   | R CARBON FILM | 1/2 10 OHM J   |
| R806  | RD-2Z472J-   | R CARBON FILM | 1/2 4.7K OHM J |
| R807  | RD-2Z272J-   | R CARBON FILM | 1/2 2.7K OHM J |
| R808  | RD-2Z821J-   | R CARBON FILM | 1/2 820 OHM J  |
| R810  | RD-4Z102J-   | R CARBON FILM | 1/4 1K OHM J   |
| R811  | RC-2Z565KP   | R CARBON COMP | 1/2 5.6M OHM K |
| R817  | RD-AZ473J-   | R CARBON FILM | 1/6 47K OHM J  |
| R820  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R821  | RD-4Z102J-   | R CARBON FILM | 1/4 1K OHM J   |
| R823  | RD-2Z392J-   | R CARBON FILM | 1/2 3.9K OHM J |
| R829  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J  |
| R830  | RD-AZ332J-   | R CARBON FILM | 1/6 3.3K OHM J |
| R841  | RD-2Z470J-   | R CARBON FILM | 1/2 47 OHM J   |
| R851  | RD-AZ391J-   | R CARBON FILM | 1/6 390 OHM J  |
| R852  | RD-AZ102J-   | R CARBON FILM | 1/6 1K OHM J   |
| R855  | RD-4Z335J-   | R CARBON FILM | 1/4 3.3M OHM J |
| R870  | RD-4Z222J-   | R CARBON FILM | 1/4 2.2K OHM J |
| RA01  | RD-AZ220J-   | R CARBON FILM | 1/6 22 OHM J   |
| RA02  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| RA03  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| RA04  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| RA05  | RD-AZ333J-   | R CARBON FILM | 1/6 33K OHM J  |
| RA06  | RD-AZ750J-   | R CARBON FILM | 1/6 75 OHM J   |
| RA07  | RD-AZ333J-   | R CARBON FILM | 1/6 33K OHM J  |
| RA08  | RD-AZ750J-   | R CARBON FILM | 1/6 75 OHM J   |
| RA09  | RD-AZ750J-   | R CARBON FILM | 1/6 75 OHM J   |
| RA10  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J  |
| RA11  | RD-AZ750J-   | R CARBON FILM | 1/6 75 OHM J   |

| z_loc | z_parts_code | parts_name     | parts_descr              |
|-------|--------------|----------------|--------------------------|
| RA12  | RD-AZ750J-   | R CARBON FILM  | 1/6 75 OHM J             |
| RA13  | RD-AZ113J-   | R CARBON FILM  | 1/6 11K OHM J            |
| RA14  | RD-AZ750J-   | R CARBON FILM  | 1/6 75 OHM J             |
| RA15  | RD-AZ223J-   | R CARBON FILM  | 1/6 22K OHM J            |
| RA16  | RD-AZ750J-   | R CARBON FILM  | 1/6 75 OHM J             |
| RA19  | RD-AZ750J-   | R CARBON FILM  | 1/6 75 OHM J             |
| RA23  | RD-AZ101J-   | R CARBON FILM  | 1/6 100 OHM J            |
| RA24  | RD-AZ103J-   | R CARBON FILM  | 1/6 10K OHM J            |
| RA25  | RD-AZ750J-   | R CARBON FILM  | 1/6 75 OHM J             |
| RA26  | RD-AZ471J-   | R CARBON FILM  | 1/6 470 OHM J            |
| RA29  | RD-AZ102J-   | R CARBON FILM  | 1/6 1K OHM J             |
| RA32  | RD-AZ680J-   | R CARBON FILM  | 1/6 68 OHM J             |
| RA44  | RD-AZ113J-   | R CARBON FILM  | 1/6 11K OHM J            |
| RA51  | RD-AZ750J-   | R CARBON FILM  | 1/6 75 OHM J             |
| RA52  | RD-AZ750J-   | R CARBON FILM  | 1/6 75 OHM J             |
| RA90  | RD-AZ220J-   | R CARBON FILM  | 1/6 22 OHM J             |
| RA91  | RD-AZ473J-   | R CARBON FILM  | 1/6 47K OHM J            |
| ZZ400 | PEUNSW/D037  | PCB UNION AS   | DSC-3220E                |
| C900  | CCXB3D102K   | C CERA         | 2KV B 1000PF K (TAPPING) |
| C910  | CEXF2E479V   | C ELECTRO      | 250V RSS 4.7MF (10X16)TP |
| C997  | CEXF2E100V   | C ELECTRO      | 250V RSS 10MF (10X20) TP |
| CF02  | CMXE2J333J   | C MYLAR        | 630V PU 0.033MF J (TP)   |
| CF05  | CMXE2J333J   | C MYLAR        | 630V PU 0.033MF J (TP)   |
| CF07  | CMXE2J333J   | C MYLAR        | 630V PU 0.033MF J (TP)   |
| CF10  | CMXE2J333J   | C MYLAR        | 630V PU 0.033MF J (TP)   |
| CF11  | CMYH3D752J   | C MYLAR        | 2KV BUP 7500PF J         |
| I901  | 1TDA6107Q-   | IC VIDEO AMP   | TDA6107Q                 |
| I901A | 4857031100   | HEAT SINK      | A1050P-H24 T2.0          |
| I901B | 7174300811   | SCREW TAPPTITE | TT2 RND 3X8 MFZN         |
| IC01  | 1KSM9HP—     | IC PREAMP      | KSM-9HP                  |
| IF01  | 1MC7812—     | IC REGULATOR   | MC7812 12V 1A (KA7812)   |
| IF02  | 1KA4558—     | IC AMP         | KA4558                   |
| IT01  | 1LA6515—     | IC OP AMP      | LA6515                   |
| JZ01  | 4859105240   | JACK PHONE     | LGT1516-0100             |
| JZ02  | 4859105340   | JACK S-VHS     | YKF51-5359               |
| JZ03  | 4859105450   | JACK PIN BOARD | YSC03P-4120-9S           |
| LED1  | DSL342MC3    | LED            | SLR-342MC3               |
| LED2  | DSL342VC3    | LED            | SLR-342VC3               |
| LF01  | 58CD000021   | COIL CHOKE     | DTS-2619                 |
| M232  | 4952300701   | PANEL AV       | HIPS PAINT               |
| M232A | 7178301212   | SCREW TAPPTITE | TT2 WAS 3X12 MFZN BK     |
| M321  | 4953200600   | BRKT POWER     | EGI T1.2                 |
| M321A | 7063300612   | SCREW MACHINE  | M/C BIN 3X6 MFZN BK      |
| M491  | 4954901601   | BUTTON CH      | ABS PAINT                |
| M551  | 4955501000   | DECO SENSOR    | GPPS                     |
| M684  | 4856812001   | TIE CABLE      | NYLON66 DA100            |
| P401A | 4850704S03   | CONNECTOR      | YH025-04+YST025+ULW=300  |
| P501A | 4850705S04   | CONNECTOR      | YH025-05+YBNH250+ULW=400 |
| P603A | 4850704S04   | CONNECTOR      | YH025-04+YST025+ULW=400  |
| P701A | 4850708S03   | CONNECTOR      | YH025-08+YST025+ULW=500  |
| P803  | 4850702S10   | CONNECTOR      | BL102NG+MXH40058-02=400  |
| P903  | 4859238620   | CONN WAFER     | YPW500-02                |

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| z_loc | z_parts_code | parts_name          | parts_descr               | z_loc | z_parts_code | parts_name    | parts_descr              |
|-------|--------------|---------------------|---------------------------|-------|--------------|---------------|--------------------------|
| PA01A | 4850709N04   | CONNECTOR           | YH025-09+YBNH250+USW=400  | CZ02  | CCZB1H561K   | C CERA        | 50V B 560PF K            |
| PF01  | 4850707S02   | CONNECTOR           | YH025-07+YST025+ULW=400   | D911  | D1N4004S—    | DIODE         | 1N4004S                  |
| PF02  | 4859238620   | CONN WAFER          | YPW500-02                 | D912  | D1N4004S—    | DIODE         | 1N4004S                  |
| PF02A | 4850702N06   | CONNECTOR           | YPH500-02+YLT500+ULW=200  | D913  | D1N4004S—    | DIODE         | 1N4004S                  |
| PT01  | 4859231620   | CONN WAFER          | YW025-03                  | D997  | DLT2A05G—    | DIODE         | LT2A05G (TP)             |
| PT02  | 4850703S21   | CONNECTOR           | YH025-03+YBNH250+ULW=600  | DF01  | D1N4937G—    | DIODE         | 1N4937G (TAPPING)        |
| QF04  | T4636LSRB-   | TR                  | 2SC4636LS-RB              | DF02  | D1N4937G—    | DIODE         | 1N4937G (TAPPING)        |
| R906  | RF01Y249J-   | R FUSIBLE           | 1W 2.4 OHM J              | DF03  | D1N4937G—    | DIODE         | 1N4937G (TAPPING)        |
| R907  | RF01Y249J-   | R FUSIBLE           | 1W 2.4 OHM J              | DF04  | D1N4937G—    | DIODE         | 1N4937G (TAPPING)        |
| R908  | RF01Y249J-   | R FUSIBLE           | 1W 2.4 OHM J              | JC01  | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| RF19  | RF02Z479J-   | R FUSIBLE           | 2W 4.7 OHM J (TAPPING)    | JF1   | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| RF20  | RS01Z472J-   | R M-OXIDE FILM      | 1W 4.7K OHM J (TAPPING)   | JF2   | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| RF21  | RS01Z228J-   | R M-OXIDE FILM      | 1W 0.22 OHM J             | JF3   | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| SCT1  | 4859303730   | SOCKET CRT          | ISD-07S                   | JF4   | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| SW801 | 5S40000003   | SW POWER PUSH       | SS-160-7-G                | JF5   | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| TF01  | 50D28A1—     | TRANS DRIVE         | TD-28A1                   | JF6   | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| ZZ200 | PEUNJRD037   | PCB UNION RADIAL AS | DSC-3220E                 | JF7   | 85801065GY   | WIRE COPPER   | AWG22 1/0.65 TIN COATING |
| C902  | CMXL2E104K   | C MYLAR             | 250V MEU 0.1MF K          | LT01  | 5CPZ569K02   | COIL PEAKING  | 5.6UH K (AXIAL 3.5MM)    |
| CF01  | CEXF1C221V   | C ELECTRO           | 16V RSS 220MF (8X11.5) TP | R901  | RD-AZ221J-   | R CARBON FILM | 1/6 220 OHM J            |
| CF03  | CEXF1H330V   | C ELECTRO           | 50V RSS 33MF (6.3X11) TP  | R902  | RD-AZ221J-   | R CARBON FILM | 1/6 220 OHM J            |
| CF04  | CEXF1E101V   | C ELECTRO           | 25V RSS 100MF (6.3X11) TP | R903  | RD-AZ221J-   | R CARBON FILM | 1/6 220 OHM J            |
| CF06  | CEXF1E101V   | C ELECTRO           | 25V RSS 100MF (6.3X11) TP | R910  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J            |
| CF08  | CEXF1E101V   | C ELECTRO           | 25V RSS 100MF (6.3X11) TP | R911  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J            |
| CF09  | CEXF1E101V   | C ELECTRO           | 25V RSS 100MF (6.3X11) TP | R912  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J            |
| CF13  | CEXF1C221V   | C ELECTRO           | 16V RSS 220MF (8X11.5) TP | R913  | RD-AZ101J-   | R CARBON FILM | 1/6 100 OHM J            |
| CF14  | CEXF1E101V   | C ELECTRO           | 25V RSS 100MF (6.3X11) TP | R921  | RC-2Z102K-   | R CARBON COMP | 1/2 1K OHM K             |
| CT01  | CMXL1J474J   | C MYLAR             | 63V MEU 0.47MF J          | R922  | RC-2Z102K-   | R CARBON COMP | 1/2 1K OHM K             |
| CT02  | CMXL1J474J   | C MYLAR             | 63V MEU 0.47MF J          | R923  | RC-2Z102K-   | R CARBON COMP | 1/2 1K OHM K             |
| CT03  | CEXF1E470V   | C ELECTRO           | 25V RSS 47MF (5X11) TP    | R996  | RD-2Z105J-   | R CARBON FILM | 1/2 1M OHM J             |
| CT04  | CEXF1E470V   | C ELECTRO           | 25V RSS 47MF (5X11) TP    | R997  | RD-2Z102J-   | R CARBON FILM | 1/2 1K OHM J             |
| F01   | 5PXF1B471M   | FILTER EMI          | CFI 06 B 1H 470PF         | RC01  | RD-AZ471J-   | R CARBON FILM | 1/6 470 OHM J            |
| F02   | 5PXF1B471M   | FILTER EMI          | CFI 06 B 1H 470PF         | RC02  | RD-AZ331J-   | R CARBON FILM | 1/6 330 OHM J            |
| G900  | 4SG0DX0001   | SPARK GAP           | SSG-102-A1(1.0KV) TAP     | RC03  | RD-AZ221J-   | R CARBON FILM | 1/6 220 OHM J            |
| G901  | 4SG0DX0001   | SPARK GAP           | SSG-102-A1(1.0KV) TAP     | RC04  | RD-AZ181J-   | R CARBON FILM | 1/6 180 OHM J            |
| G902  | 4SG0DX0001   | SPARK GAP           | SSG-102-A1(1.0KV) TAP     | RF01  | RD-4Z431J-   | R CARBON FILM | 1/4 430 OHM J            |
| G903  | 4SG0DX0001   | SPARK GAP           | SSG-102-A1(1.0KV) TAP     | RF02  | RD-4Z561J-   | R CARBON FILM | 1/4 560 OHM J            |
| QF01  | TKTA1266Y-   | TR                  | KTA1266Y (TP)             | RF03  | RD-4Z332J-   | R CARBON FILM | 1/4 3.3K OHM J           |
| QF02  | TKTA1266Y-   | TR                  | KTA1266Y (TP)             | RF04  | RD-4Z361J-   | R CARBON FILM | 1/4 360 OHM J            |
| QF03  | TKTC3198Y-   | TR                  | KTC3198Y                  | RF05  | RD-4Z911J-   | R CARBON FILM | 1/4 910 OHM J            |
| RF24  | RN02B333JS   | R METAL FILM        | 2W 33K OHM J SMALL        | RF06  | RD-4Z221J-   | R CARBON FILM | 1/4 220 OHM J            |
| RF25  | RN02B333JS   | R METAL FILM        | 2W 33K OHM J SMALL        | RF07  | RD-4Z182J-   | R CARBON FILM | 1/4 1.8K OHM J           |
| RF26  | RN02B333JS   | R METAL FILM        | 2W 33K OHM J SMALL        | RF08  | RD-4Z103J-   | R CARBON FILM | 1/4 10K OHM J            |
| SW701 | 5S50101Z90   | SW TACT             | THVV502GDA                | RF09  | RD-4Z103J-   | R CARBON FILM | 1/4 10K OHM J            |
| SW702 | 5S50101Z90   | SW TACT             | THVV502GDA                | RF10  | RD-4Z103J-   | R CARBON FILM | 1/4 10K OHM J            |
| SW703 | 5S50101Z90   | SW TACT             | THVV502GDA                | RF11  | RD-4Z221J-   | R CARBON FILM | 1/4 220 OHM J            |
| SW704 | 5S50101Z90   | SW TACT             | THVV502GDA                | RF12  | RD-4Z513J-   | R CARBON FILM | 1/4 51K OHM J            |
| SW705 | 5S50101Z90   | SW TACT             | THVV502GDA                | RF13  | RD-4Z103J-   | R CARBON FILM | 1/4 10K OHM J            |
| ZZ200 | PEUNJAD037   | PCB UNION AXIAL AS  | DSC-3220E                 | RF14  | RD-4Z104J-   | R CARBON FILM | 1/4 100K OHM J           |
| A001  | 4959812324   | PCB UNION           | 246X243 D1B               | RF15  | RD-4Z103J-   | R CARBON FILM | 1/4 10K OHM J            |
| CC01  | CBZF1H104Z   | C CERA SEMI         | 50V F 0.1MF Z             | RF16  | RD-4Z153J-   | R CARBON FILM | 1/4 15K OHM J            |
| CT05  | CBZF1H104Z   | C CERA SEMI         | 50V F 0.1MF Z             | RF17  | RD-4Z242J-   | R CARBON FILM | 1/4 2.4K OHM J           |
| CZ01  | CCZB1H561K   | C CERA              | 50V B 560PF K             | RF18  | RD-4Z183J-   | R CARBON FILM | 1/4 18K OHM J            |

| z_loc | z_parts_code | parts_name    | parts_descr    | z_loc | z_parts_code | parts_name    | parts_descr    |
|-------|--------------|---------------|----------------|-------|--------------|---------------|----------------|
| RF27  | RD-4Z221J-   | R CARBON FILM | 1/4 220 OHM J  | RT06  | RD-AZ683J-   | R CARBON FILM | 1/6 68K OHM J  |
| RT01  | RD-2Z100J-   | R CARBON FILM | 1/2 10 OHM J   | RT07  | RD-AZ563J-   | R CARBON FILM | 1/6 56K OHM J  |
| RT02  | RD-AZ683J-   | R CARBON FILM | 1/6 68K OHM J  | RT08  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J  |
| RT03  | RD-AZ334J-   | R CARBON FILM | 1/6 330K OHM J | RT09  | RD-AZ222J-   | R CARBON FILM | 1/6 2.2K OHM J |
| RT04  | RD-AZ362J-   | R CARBON FILM | 1/6 3.6K OHM J | RT10  | RD-AZ103J-   | R CARBON FILM | 1/6 10K OHM J  |
| RT05  | RD-2Z100J-   | R CARBON FILM | 1/2 10 OHM J   |       |              |               |                |

## Service manual SC-150

### 6-2. Service Parts List option

\* THE DIFFERENT PART LIST BY PCB & MICOM VERSION

#### MAIN PCB

| MICOM/PCB Ver.<br>Loc | 4959812224-00 | 4959812224-01 |                  |
|-----------------------|---------------|---------------|------------------|
|                       | DW3834-C4-AE2 | DW3834-C4-AE2 | New Micom(V0.24) |
| RB02                  | ○             | ○             | X                |
| P502                  | ○             | ○             | X                |
| P503                  | —             | X             | ○                |

#### UNION PCB

| MICOM/PCB Ver.<br>Loc | 4959812324-00 | 4959812324-01 |                  |
|-----------------------|---------------|---------------|------------------|
|                       | DW3834-C4-AE2 | DW3834-C4-AE2 | New Micom(V0.25) |
| IT01                  | —             | JUMPER        | DEL              |
| JT02                  | —             | JUMPER        | DEL              |
| JT03                  | —             | —             | JUMPER           |
| CT04                  | 25V 47UF      | ←             | DEL              |
| CT06                  | —             | —             | 25V 47UF         |
| DT01                  | —             | —             | Z9.1             |
| IT02                  | —             | —             | CXA1315P         |
| RT04                  | 1/6 3.6K      | ←             | 1/6 3K           |
| RT08                  | 1/6 10K       | ←             | JUMPER           |
| RT09                  | 1/6 2.2K      | ←             | DEL              |
| RT10                  | 1/6 10K       | ←             | 1/6 4.7K         |
| RT11                  | —             | —             | 1/6 100          |
| RT12                  | —             | —             | 1/6 100          |
| RT13                  | —             | —             | 1/6 200          |

\* THE DIFFERENT PART LIST BY MODEL NAME

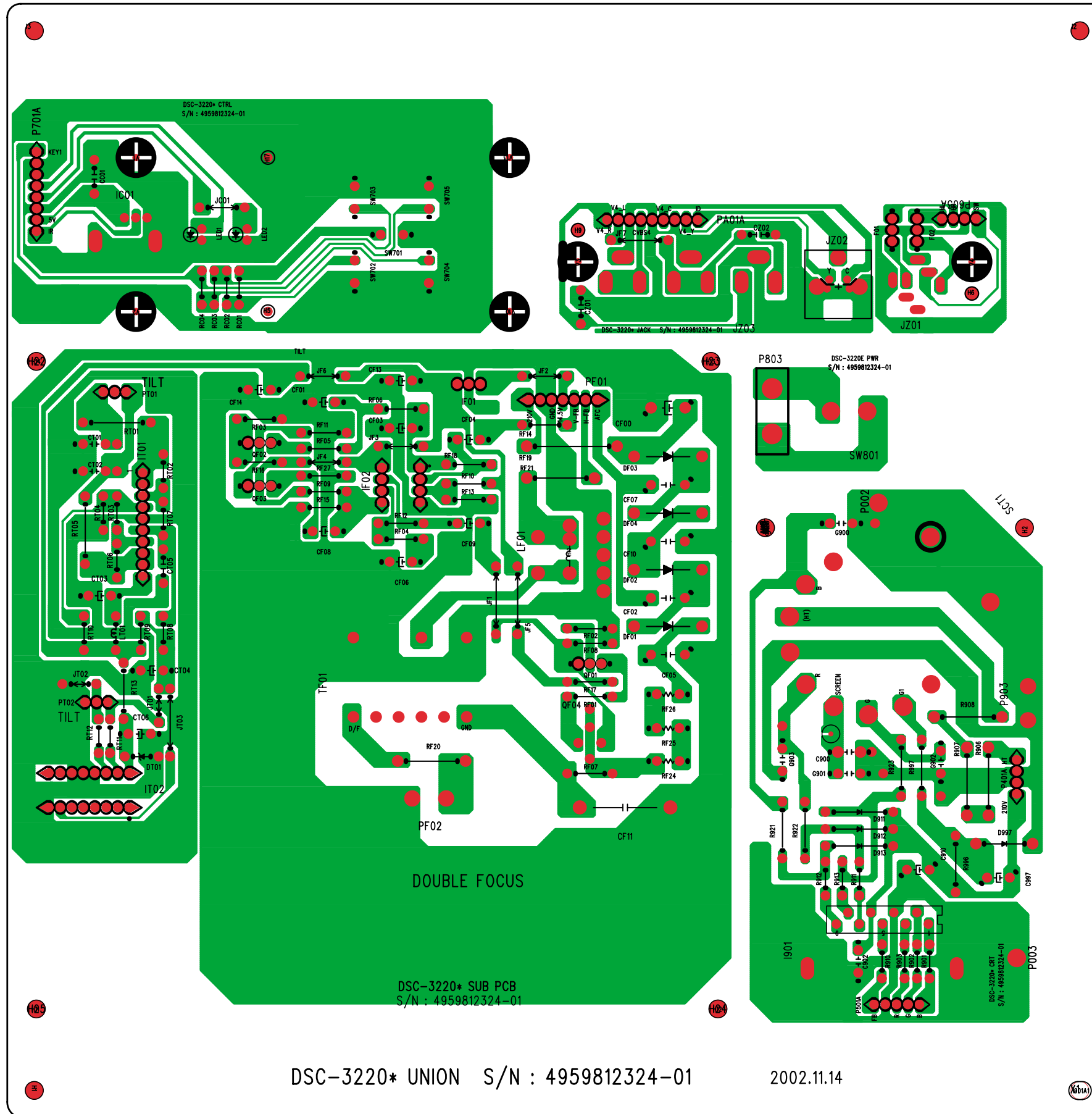
| LOC  | DSC-3220E         | DSC-3220L |
|------|-------------------|-----------|
| I601 | MSP3410G-PP-B8-V3 | MSP3411G  |



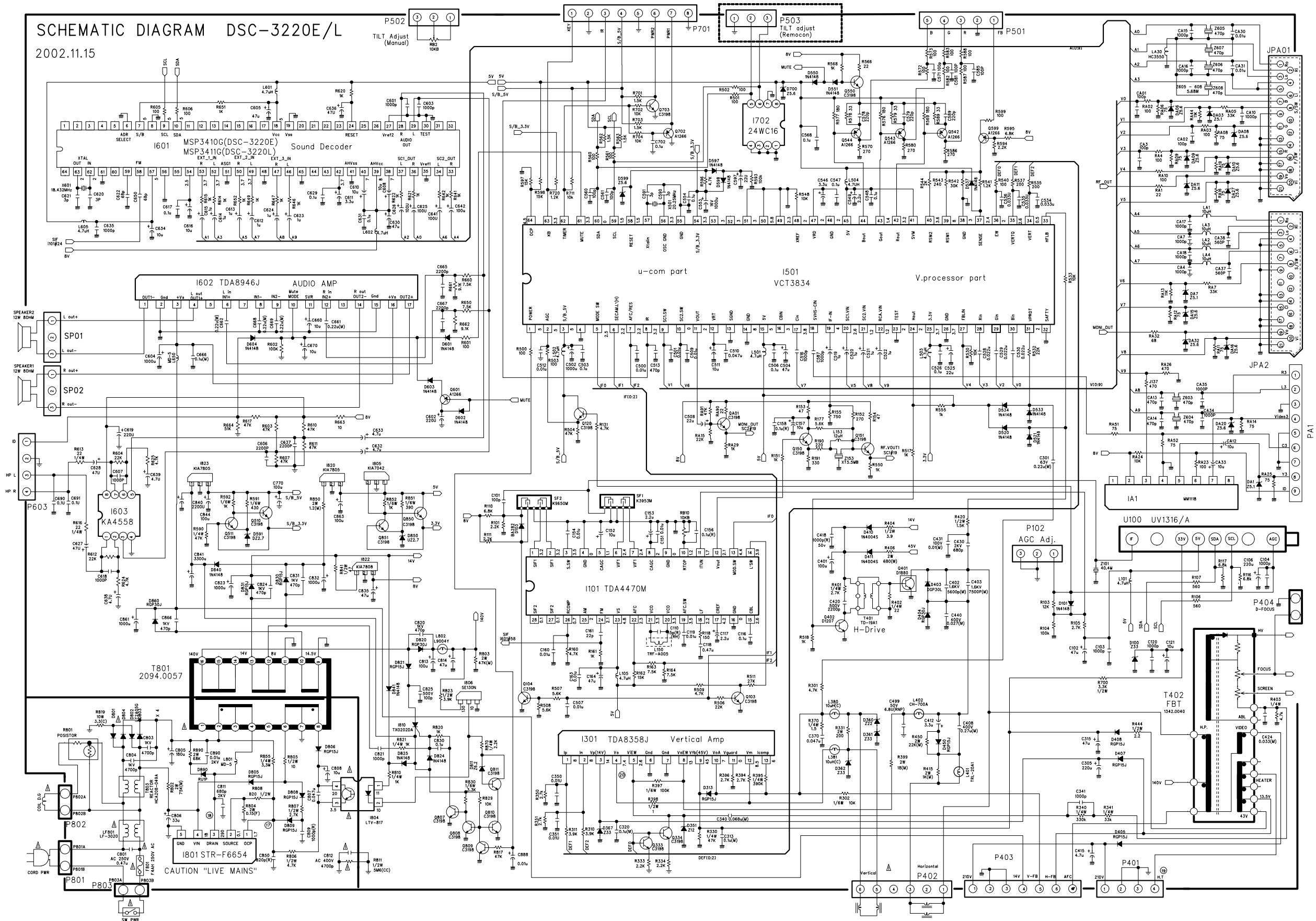




8-2. PCB UNION



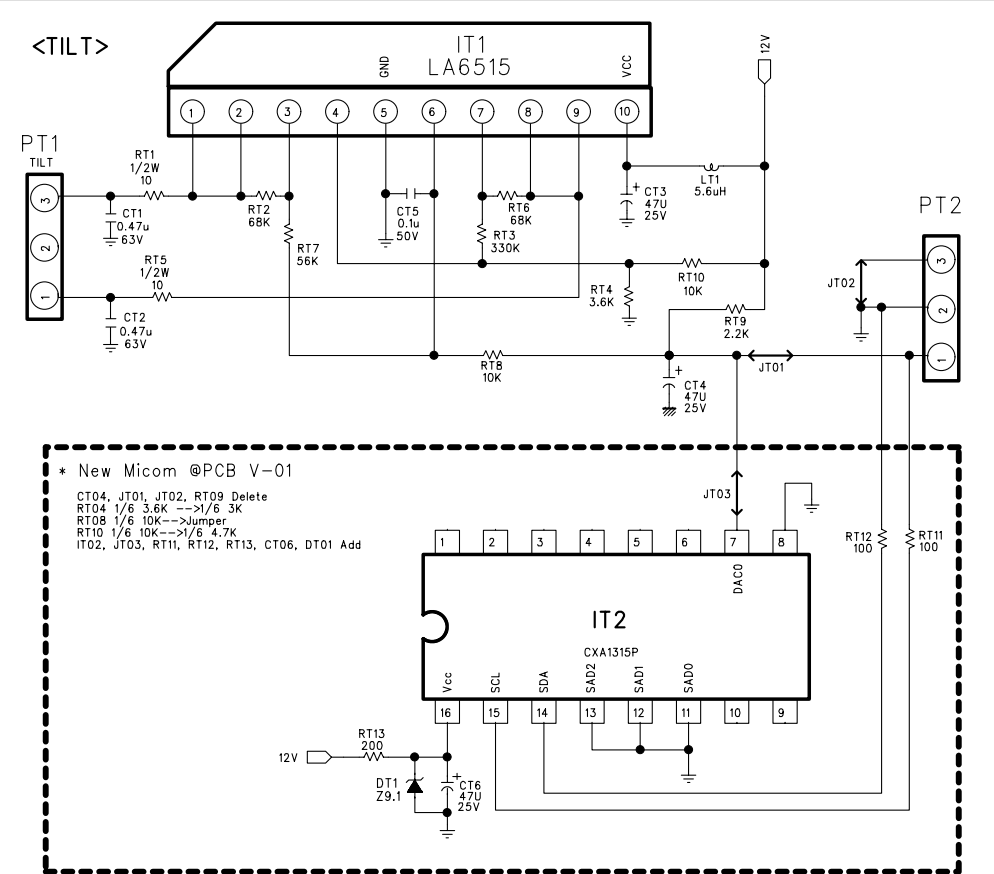
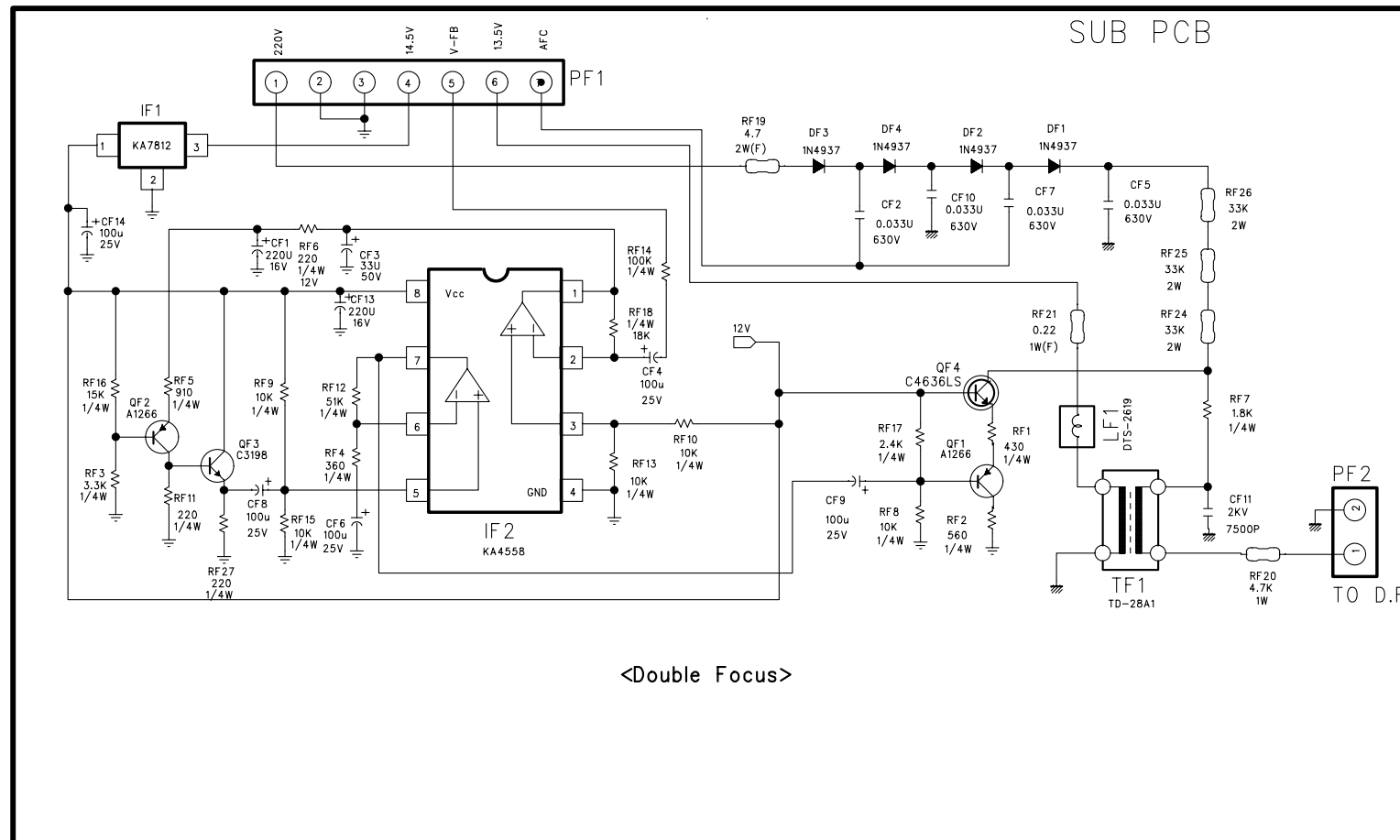
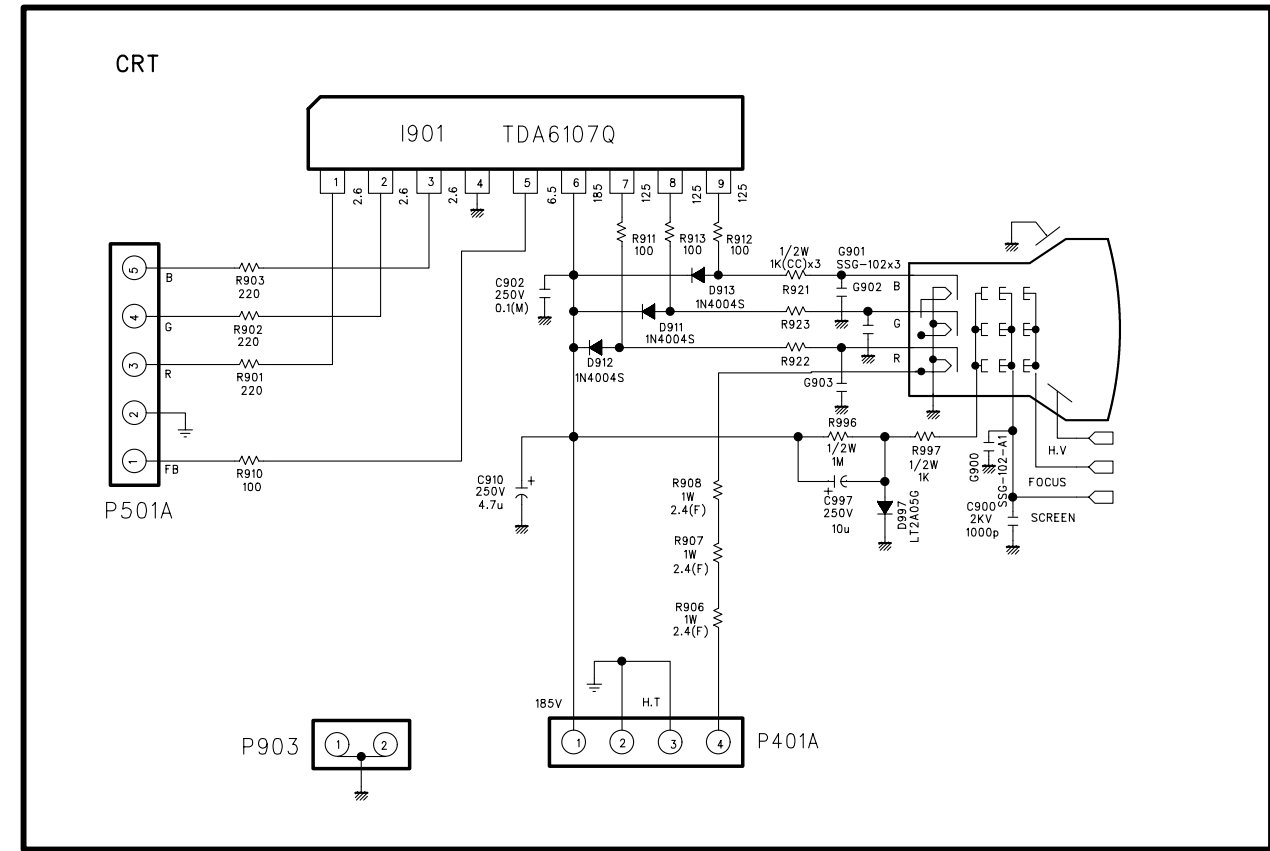
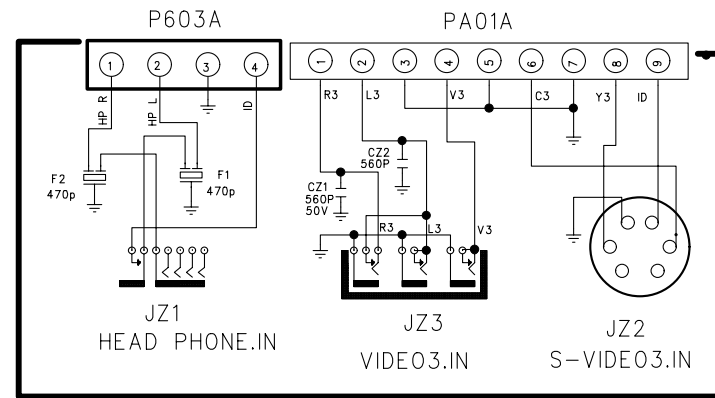
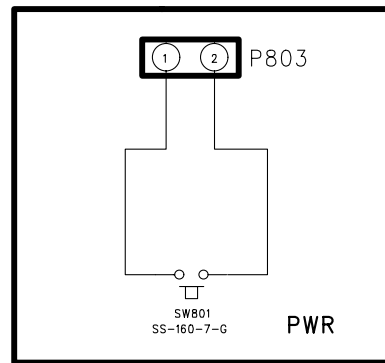
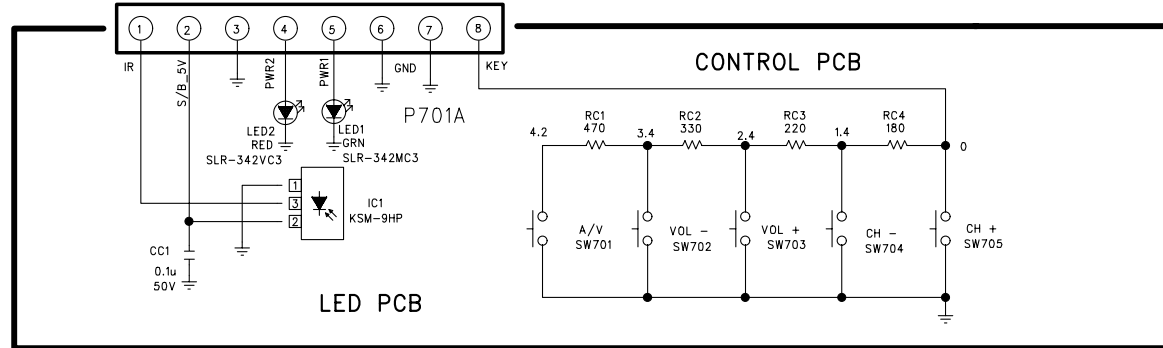
9-1. Schematic Diagram(MAIN)



9-2. Schematic Diagram(UNION)

DSC-3220E/L  
UNION 2002. 11. 15.

S/N:4859812324



**DAEWOO**

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